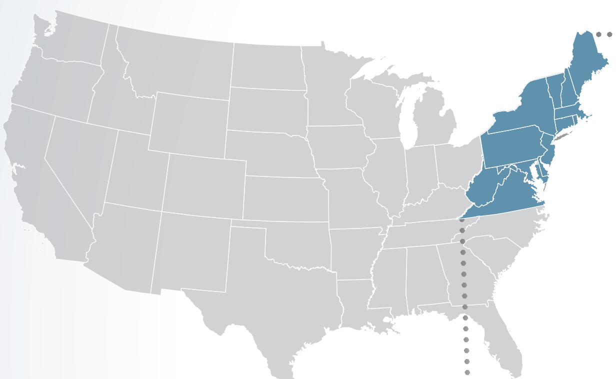
FirstNet®

Nationwide Public Safety Broadband Network

Draft Programmatic Environmental Impact Statement for the Eastern United States

VOLUME 9 - CHAPTER 11



Connecticut
Delaware
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First Responder Network Authority

FirstNet®

Nationwide Public Safety Broadband Network

Draft Programmatic Environmental Impact Statement for the Eastern United States

VOLUME 9 - CHAPTER 11

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Cooperating Agencies
Federal Communications Commission
General Services Administration
U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Agriculture—Natural Resource Conservation Service
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

April 2016

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11 NEW YORK

Founded early in the 17th century by Dutch settlers, New York was one of our nation's 13 original colonies (New York State Department of State 2008). Located in the northeastern portion of the United States, New York shares borders with Canada to the north, the Great Lakes to the west, and six other states (Connecticut, Massachusetts, New Jersey, Pennsylvania, Rhode Island, and Vermont) to the south and east. This chapter provides details about the existing environment of New York as it relates to the Proposed Action.

General facts about New York are provided below:

- **State Nickname**: Empire State
- **Land Area**: 47,126 square miles; U.S. Rank: 27th (U.S. Census Bureau, 2014)
- **Capital**: Albany
- **Counties**: 62 (U.S. Census Bureau, 2015a)
- **Estimated Population**: 19,746,227; **U.S. Rank**: 4th (U.S. Census Bureau, 2015a)
- **Most Populated Cities**: New York City, Buffalo, Rochester, Yonkers, and Syracuse (U.S. Census Bureau, 2015a)
- **Main Rivers**: Niagara River, Allegheny River, Genesee River, Oswego River, Chemung River, St. Lawrence River, Black River, Susquehanna River, Delaware River, Mohawk River, and the Hudson River
- **Bordering Waterbodies**: Atlantic Ocean, Lake Ontario, Lake Erie, and Lake Champlain
- **Mountain Ranges**: Adirondack Mountains, Catskill Mountains, and a portion of the Appalachian Mountains
- **Highest Point**: Mt. Marcy (5,344 ft) (New York State Department of State 2008)

11.1 AFFECTED ENVIRONMENT

11.1.1 Infrastructure

11.1.1.1 Definition of the Resource

This section provides information on key New York infrastructure resources that could potentially be affected by FirstNet projects. Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is entirely manmade with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "developed." Infrastructure includes a broad array of facilities such as utility systems, streets and highways, railroads, airports, buildings and structures, ports, harbors and other manmade facilities. Individuals, businesses, government entities, and virtually all relationships between these groups depend on infrastructure for their most basic needs, as well as for critical and advanced needs (e.g., emergency response, health care, and telecommunications).

Section 11.1.1.3 provides an overview of the New York's traffic and transportation infrastructure, including road and rail networks and waterway facilities. New York's public safety infrastructure could include any infrastructure utilized by a public safety entity[1] as defined in the Act, including infrastructure associated with police, fire, and emergency medical services (EMS). However, other organizations can qualify as public safety services as defined by the Act. Public safety services in New York are presented in more detail in Section 11.1.1.4. Section 11.1.1.5 describes New York's public safety communications infrastructure and commercial telecommunications infrastructure. An overview New York's utilities, such as power, water, and sewer, is presented in Section 11.1.1.6.

11.1.1.2 Specific Regulatory Considerations

Multiple New York laws and regulations pertain to the state's public utility and transportation infrastructure and its public safety community. Table 11.1.1-1 identifies the relevant laws and regulations for New York infrastructure. Appendix C, Environmental Laws and Regulations, identifies applicable federal laws and regulations.

Table 11.1.1-1: Relevant New York Infrastructure Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
New York Code (NYC) Title 17 Department of Transportation	New York State Department of Transportation (NYSDOT)	Develops transportation policy and plans
New York Codes, Rules, and Regulations (NYCRR) Title 16 Department of Public Service	Department of Public Service	Regulates retail electricity, natural gas, steam, water, and telecommunications services, providers, and facilities

[1] The term "public safety entity" means an entity that provides public safety services. (7 U.S. Code [U.S.C.] § 140126)

State Law/Regulation	Regulatory Agency	Applicability
NYCRR Title 19 Department of State	State Office of Homeland Security	Coordinates emergency services and directs state disaster operations including fire, flood, earthquake, hurricane, tornado, high water, landslide, mudslide, wind, storm, etc.

Source: (New York State Legislature, 2016)

11.1.1.3 Transportation

This section describes the transportation infrastructure in New York, including specific information related to the road networks, airport facilities, rail networks, harbors, and ports (this PEIS defines "harbor" as a body of water deep enough to allow anchorage of a ship or boat). The movement of vehicles is commonly referred to as traffic, as well as the circulation along roads. Roadways can range from multilane road networks with asphalt surfaces to unpaved gravel or private roads. The information regarding existing transportation systems in New York are based on a review of maps, aerial photography, and federal and state data sources.

The New York State Department of Transportation (NYSDOT) has jurisdiction over freeways and major roads, airports, railroads, mass transit, and ports in the state; local counties have jurisdiction for local streets and roads. The responsibilities of the NYSDOT include "coordinating and developing comprehensive transportation policy for the State; coordinating and assisting in the development and operation of transportation facilities and services for highways, railroads, mass transit systems, ports, waterways and aviation facilities; and, formulating and keeping current a long-range, comprehensive statewide master plan for the balanced development of public and private commuter and general transportation facilities" (NYSDOT, 2015a).

New York has an extensive and complex transportation system across the entire state and New York City. The state's transportation network is comprised of:

- Over 113,000 miles of highways and over 17,400 bridges (NYSDOT, 2015b),
- 3,500 miles of rail network that includes passenger rail and freight (NYSDOT, 2015b),
- 600 aviation facilities that include both public and private airports (FAA, 2015a) (USDOT, 2015a),
- 62 harbors (US Harbors, 2015), and
- 12 major ports that include both public and private facilities (NYSDOT, 2015b),
- Commercial and recreational vessel harbors and shoreline infrastructure (DDOT, 2014b) (CNIC, 2015) (DC Metropolitan Police Department, 2016).

Road Networks

As identified in Figure 11.1.1-1, the major urban centers of the state are New York City in the southeastern corner of the state, and from west to east across the central section of the state: Buffalo, Rochester, Syracuse, and Albany (DOC, 2013a). New York has nine major interstates connecting its major metropolitan areas to one another, as well as to other states. Table 11.1.1-2 lists the interstates and their start/end points in New York. Per the national standard, even numbered interstates run from west to east with the lowest numbers beginning in the south; odd numbered interstates run from north to south with the lowest numbers beginning in the west (USDOT, 2015b). Travel to local towns is conducted mainly via state and county routes (NYSDOT, 2015c).

In addition to the Interstate System, New York has both National Scenic Byways and State Scenic Byways. Both National and State Scenic Byways are roads that are recognized for one or more archaeological, cultural, historic, natural, recreational, and scenic qualities. Figure 11.1.1-1 illustrates the major transportation networks, including roadways, in New York. Section 11.1.8, Visual Resources, describes the National and State Scenic Byways found in New York from an aesthetic perspective.

Table 11.1.1-2: New York Interstates

Interstate	Southern or Western Terminus in NY	Northern or Eastern Terminus in NY
I-78	NJ line at Manhattan	Manhattan
I-84	PA line at Port Jervis	CT line at Southeast
I-86	PA line at Mina	Elmira
I-88	Chenango	Rotterdam
I-90	PA line at Ripley	MA line at Canaan
I-81	PA line at Kirkwood	Canadian border at Thousand Islands
I-87	The Bronx	Canadian border at Champlain
I-95	NJ line at Manhattan	CT line at Port Chester

National Scenic Byways are roads with nationwide interest; these byways are designated and managed by the U.S. Department of Transportation’s Federal Highway Administration (FHWA). New York has the three following National Scenic Byways:

- Great Lakes Seaway Trail, National Scenic Byway: New York’s portion of the Great Lakes Seaway Trail is 454 miles along the New York and Canadian borders and connects the towns of Ripley and Massena in the Great Lakes region (NYSDOT, 2015d);
- Lakes to Locks Passage, All American Road: Located in the eastern Adirondack Mountains in the Champlain Valley, the Lakes to Locks Passage is 190 miles that connects the towns of Waterford and Rouses Point (NYSDOT, 2015e); and
- Mohawk Towpath Byway, National Scenic Byway: This byway runs 25 miles and connects the cities of Schenectady and Waterford in the Albany Capital District (NYSDOT, 2015f).

State Scenic Byways are roads with statewide interest; State Scenic Byways are designated and managed by NYSDOT. New York has 26 State Scenic Byways that crisscross the entire state (NYSDOT, 2015g):

- Adirondack Trail
- Black River Trail
- Blue Ridge Road
- Bronx River Parkway
- Cayuga Lake Scenic Byway
- Central Adirondack Trail
- Dude Ranch Trail
- Durham Valley Scenic Byway
- High Peaks Byway (Route 73)
- Historic Parkways of Long Island
- Maple Traditions
- Military Trail
- Mountain Cloves
- North Fork Trail
- Olympic Trail
- Palisades Scenic Byway
- Revolutionary Byway
- Roosevelt-Marcy Trail
- Route 20 Scenic Byway
- Scenic Route 90
- Seneca Lake Byway
- Shawangunk Mountains
- Southern Adirondack Trail
- Taconic Parkway
- Upper Delaware (Route 97)
- WNY Southtowns Scenic Byway

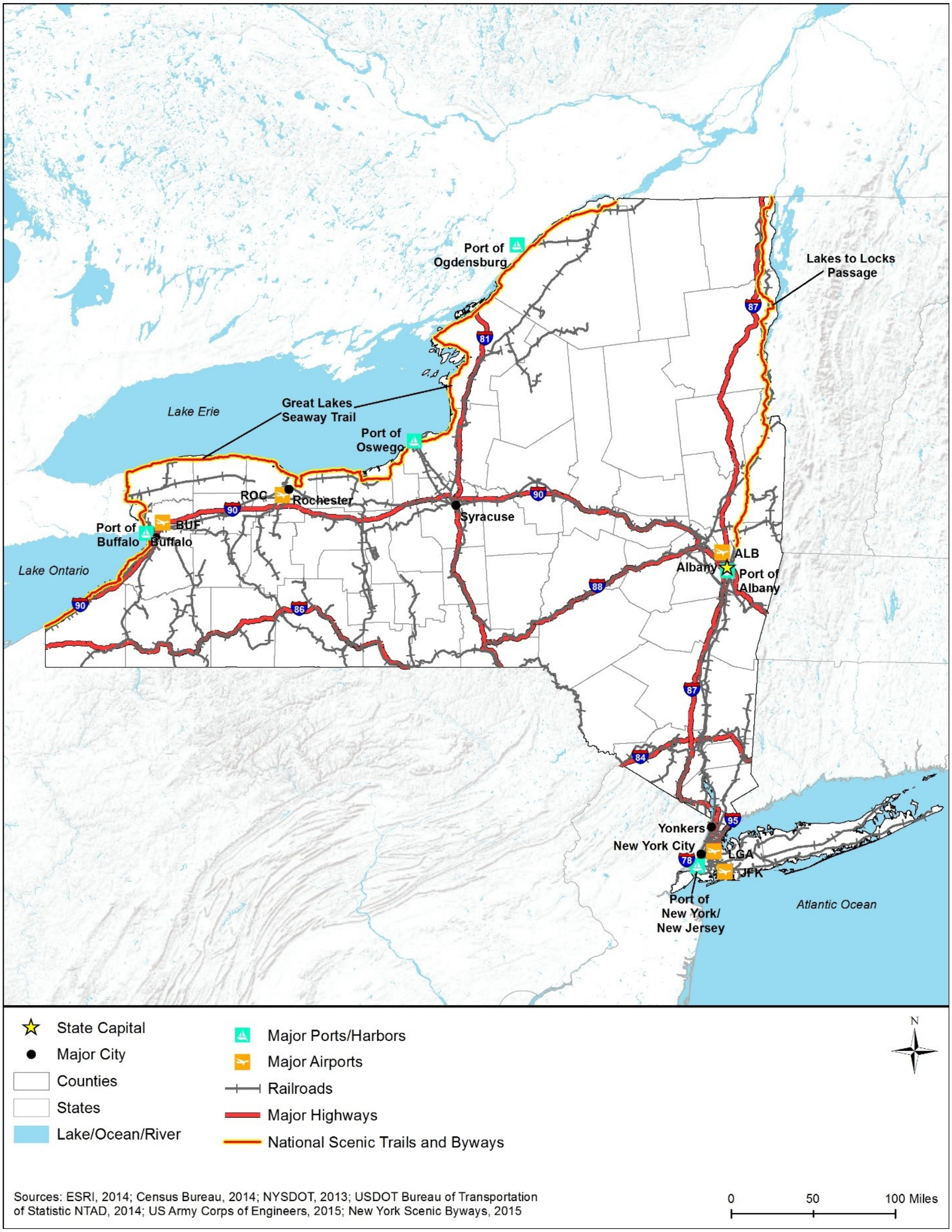


Figure 11.1.1-1: New York Transportation Networks

Airports

Air service to the state is provided by a number of major international airports. The three largest international airports—two located in New York City and one located in nearby Newark, NJ—are managed by the Port Authority of New York and New Jersey:

- John F. Kennedy International Airport (JFK) on Jamaica Bay in the southeastern section of the New York City borough of Queens: In 2014, the airport moved over 53.2 million passengers and over 1.3 million tons of cargo (The Port Authority of NY & NJ, 2015a). JFK also houses a Port of Entry for flight cargo, which is managed by the Port Authority;
- LaGuardia Airport (LGA) borders Flushing Bay and Bowery Bay in the northwestern section of the New York City borough of Queens: In 2014, the airport moved over 26.9 million passengers and over 7,000 tons of cargo (The Port Authority of NY & NJ, 2015b); and
- Newark Liberty International Airport (EWR) in Newark, New Jersey: In 2014, the airport moved over 35.6 million passengers and over 666,000 tons of cargo (The Port Authority of NY & NJ, 2015c).

Other large airports in the state include Syracuse Hancock International Airport (SYR), Buffalo Niagara International Airport (BUF), Albany International Airport (ALB), and Greater Rochester International Airport (ROC) (NYSDOT, 2015h). Figure 11.1.1-1 illustrates the major transportation networks, including airports, in the state. Section 11.1.7, Land Use, Airspace, and Recreation, provides greater detail on airports and airspace in New York.

Rail Networks

New York is connected to an extensive rail network of passenger rail (Amtrak), public transportation (commuter rail), and freight rail. In 2010, New York had almost 3,500 miles of tracks in the state: four major freight (also known as Class I), 30 to 35 regional, five tourist, and four commuter railroads (NYSDOT, 2015i). The NYSDOT reports that each county in the state has at least one active rail line, and over 95 percent of the state's major cities (59 of 62) are situated on active railroads (NYSDOT, 2015i). The Metropolitan Transportation Authority (MTA) is a public-benefit corporation chartered by the New York State Legislature. The MTA operates Metro-North Railroad, the Long Island Railroad, and New York City Transit, which includes the subway and bus systems. Metro-North operates on more than 775 miles of track and the Long Island Railroad operates on more than 700 miles of track (NYSDOT, 2015j). Figure 11.1.1-1 illustrates the major transportation networks, including rail lines, in New York.

Amtrak runs numerous lines throughout New York, including the Acela Express and Northeast Regional, which is a popular line, with routes running from Washington, D.C. to Boston in 6 hours 40 minutes and 7 hours 50 minutes, respectively. Other lines include the Adirondack line (approximately 380 miles) connecting New York City and Montreal in about 10 hours, and the Empire line (400 miles) between New York City and Niagara Falls in about 7.5 hours (Amtrak, 2015a). Table 11.1.1-3 provides a complete list of Amtrak lines that run through New York.

Table 11.1.1-3: Amtrak Train Routes Serving New York

Route		Starting Point	Ending Point	Length of Trip	Major Cities Served in New York
Acela Express		Boston, MA	Washington, D.C.	6 hours 40 minutes	New York City
Adirondack		Montreal, QC	New York, NY	10 hours	Albany, New York City
Cardinal		New York, NY	Chicago, IL	26 hours 30 minutes	New York City
Carolinian		New York, NY	Charlotte, NC	13 hours 30 minutes	New York City
Crescent		New York, NY	New Orleans, LA	30 hours	New York City
Empire Service		New York, NY	Niagara Falls, NY	7 hours 20 minutes	New York City, Albany, Syracuse, Rochester, Buffalo, Niagara Falls
Ethan Allen Express		Rutland, VT	New York, NY	5 hours 30 minutes	Albany, New York City
Keystone		New York, NY	Harrisburg, PA	3 hours 50 minutes	New York City
Lake Shore Limited		New York, NY or Boston, MA	Chicago, IL	19 hours	New York City
Maple Leaf		Toronto, ON	New York, NY	12 hours 30 minutes	Niagara Falls, New York City
Northeast Regional		Boston, MA	Virginia Beach, VA	12 hours 30 minutes	New York City
Pennsylvanian		New York, NY	Pittsburgh, PA	9 hours 20 minutes	New York City
Palmetto		New York, NY	Tampa/Miami, FL	28+ hours	New York City
Vermonter		St. Albans, VT	Washington, D.C.	13 hours 45 minutes	New York City

Source: (Amtrak, 2015a) (Amtrak, 2015b)

According to the NYSDOT, with close to 82 million passengers reported in 2011, New York's Metro-North railroad is the nation's busiest commuter railroad. Metro-North's three lines radiate out from its hub located in Manhattan, Grand Central Station: the Hudson line runs north along the Hudson River, the Harlem line runs north through Harlem and into Westchester County, and the New Haven line runs northeast into Connecticut (NYSDOT, 2015j).

The Long Island Railroad (LIRR) is the second largest commuter railroad in the U.S. with close to 81 million passengers reported in 2011. The LIRR operates out of Penn Station in Manhattan and the Atlantic Terminal in Brooklyn in the west, as well as several small, local terminals throughout Queens and Long Island in the east. The LIRR has 112 routes along the length of Long Island (NYSDOT, 2015j).

New Jersey Transit operates two lines that run into New York: the Port Jervis Line (Port Jervis, NY to/from Hoboken, NJ) routes through New York for 64 of its 95 miles, and the Pascack Valley Line (Spring Valley, NY to/from Hoboken, NJ) for six of its 33 miles (NYSDOT, 2015j).

The New Jersey Transit system has a total ridership of over 70 million passengers annually as of 2014 (NYSDOT, 2015j).

The New York City Subway system serves 5.6 million passengers on a daily basis and 1.751 billion passengers annually, as reported by the MTA for 2014. The system is one of the busiest subway systems in the world with 660 miles of track and 468 stations (MTA, 2015).

The state hosts major freight rail facilities and yards in Buffalo, Syracuse, Albany, Binghamton, and New York City. In 2010, cargo freight traveling via rail lines originating in New York totaled close to 7.5 million tons, and 22 million tons of cargo freight ended in New York (NYSDOT, 2015i).

Harbors and Ports

The U.S. Customs and Border Protection (CBP) defines a Port of Entry as "places (seaports, airports, or land border ports) designated by the Secretary of the Department of Homeland Security where CBP Officers or employees are assigned to accept entries of merchandise, clear passengers, collect duties, and enforce the various provisions of CBP and other agency laws" (U.S. Customs and Border Protection, 2014). The CBP lists 12 Ports of Entry for New York: Albany, Alexandria Bay, Binghamton, Buffalo, Champlain, John F. Kennedy International Airport, Massena, Ogdensburg, Rochester, Rome, Syracuse, and Trout River (U.S. Customs and Border Protection, 2015a). New York also maintains five major inland and seaports through which the state completes its waterborne trade: New York Harbor, the Port of Albany, the Port of Buffalo, the Port of Ogdensburg, and the Port of Oswego (NYSDOT, 2015k). The Ports of Albany and New York are located along the Hudson River on the eastern side of the state, while the Ports of Buffalo, Ogdensburg, and Oswego are located along the Great Lakes on the western side of the state. New York is also home to 524 miles of canals connecting the Hudson River to the Great Lakes (NYSDOT, 2015k).

New York is home to over 60 harbors (US Harbors, 2015). New York Harbor, located at the mouth of the Hudson River and emptying into New York Bay and the Atlantic Ocean, is home to the Port of New York and New Jersey (Figure 11.1.1-1). The Port is governed by the Port Authority of New York and New Jersey and is comprised of six marine terminals, found on New York Harbor, split between the two states. Port Newark, the Elizabeth-Port Authority Marine Terminal, and Port Jersey are found in New Jersey, while the Howland Hook Marine Terminal, the Brooklyn-Port Authority Marine Terminal, and the Red Hook Container Terminal sit in New York. Over 3.3 million cargo containers were transported into or out of the Port Authority in 2014 (The Port Authority of NY & NJ 2015e). All three terminals located in New York can be all be accessed via I-278.

The ExpressRail system, a dedicated container transport rail system, has three terminals, two in New Jersey, and one facility in New York, the Howland Hook Marine Terminal on Staten Island. This rail system connects to regional rail systems, allowing for ground transport to and from the port terminals (The Port Authority of NY & NJ, 2015d). In 2013, the United States Census Bureau recorded the Port of New York as having exported \$3.94 billion (B) worth of goods and imported \$10.7B. While the Port Newark is physically located in New Jersey, it is part of the overall Port of New York and New Jersey. In 2013, the Port of Newark was the site of exchanges for $1.47B worth of imported goods and $1.59B worth of exports (U.S. Census Bureau, 2015b).

The Port of Albany sits near the northern end of the Hudson River, at the crossroads of several U.S. highways, including I-90 and I-87, linking the port to Buffalo and Syracuse in New York; Cleveland and Toledo in Ohio; Detroit, Michigan; the Mid-Atlantic region; and New England and Canada to the east and north. The Port's location on the Hudson River can be seen in Figure 11.1.1-1. U.S. Census data from 2013 listed the Port of Albany as being responsible for the import of $79.4 million (M) worth of goods and the export of goods valued at $768.4M (U.S. Census Bureau, 2015b).

The Port of Buffalo, seen in Figure 11.1.1-1, is located at the eastern end of Lake Erie near Niagara Falls. With its proximity to I-90, and its resulting connections to the northeast and northern Central states of the U.S., the Port of Buffalo is an important U.S. port of call in the Great Lakes. Its location also puts the port in position for trade with several of Canada's population centers. U.S. Census data on foreign trade indicates that the Port of Buffalo-Niagara Falls imported $41.4B worth of goods, and exported $44B in goods in 2013 (U.S. Census Bureau, 2015b).

The Port of Ogdensburg, the northernmost port in New York, is situated south of Montreal on the St. Lawrence Seaway (Figure 11.1.1-1). Given its location, the port is frequently used for shipping to and from northern Europe. The Port of Ogdensburg also shares its grounds with the Oswego Border Patrol Station, an element of U.S. Customs and Border Protection (U.S. Customs and Border Protection 2015b). The 26-mile long New York and Ogdensburg Railway connects the port to a CSX Corporation Transportation (CSX) rail interchange in Norwood, New York (Ogdenburg Bridge and Port Authority, 2015). The port has no interstate connections, and can be reached via the Macdonald-Cartier Freeway from Ontario, Canada, or New York State Route 812. The port was listed by the U.S. Census Bureau as importing goods with a value of $28.8M in cargo and exporting goods with a value of $430.5M in 2013 (U.S. Census Bureau, 2015b).

The Port of Oswego is the first port on the Great Lakes that can be accessed from the St. Lawrence Seaway. As depicted in Figure 11.1.1-1, the Port of Oswego is situated on Lake Ontario within 750 miles of half of the populations of the U.S. and Canada. The CSX rail connects the port's docks to main rail lines, allowing for easy transport to and from the port. Due to its location on the St. Lawrence Seaway, there are no interstate connections to the port. Ground access can be found via New York State Route 104 (Port of Oswego Authority, 2015). In 2013, the Port of Oswego imported goods with a value of $249M in cargo and exported $1.8M (U.S. Census Bureau, 2015b).

11.1.1.4 Public Safety Services

New York public safety services generally consist of public safety infrastructure and first responder personnel throughout the state. The general abundance and distribution of public safety services may roughly follow key state demographic indicators. Table 11.1.1-4 presents New York's key demographics including population; land area; population density; and number of counties, cities/towns, and municipal governments. More information about these demographics is presented in Section 11.1.9, Socioeconomics.

Table 11.1.1-4: Key New York Indicators

New York Indicators	
Estimated Population (2014)	19,746,227
Land Area (square miles) (2010)	47,126
Population Density (persons per sq. mile) (2010)	419
Municipal Governments (2013)	618
Cities and Towns (2007)	345
Counties (2015)	62

Sources: (U.S. Census Bureau, 2015c) (National League of Cities, 2007) (New York State, 2015a)

Table 11.1.1-5 presents New York's public safety infrastructure, including fire and police stations. Table 11.1.1-6 identifies first responder personnel including dispatch, fire and rescue, law enforcement, and emergency medical personnel in the state.

Table 11.1.1-5: Public Safety Infrastructure in New York by Type

Infrastructure Type	Number
Fire and Rescue Stations	4,279
Law Enforcement Agencies	448
Fire Departments	2,669

Sources: (National Fire Department Census, 2015) (Reaves, 2011)

Table 11.1.1-6: First Responder Personnel in New York by Type

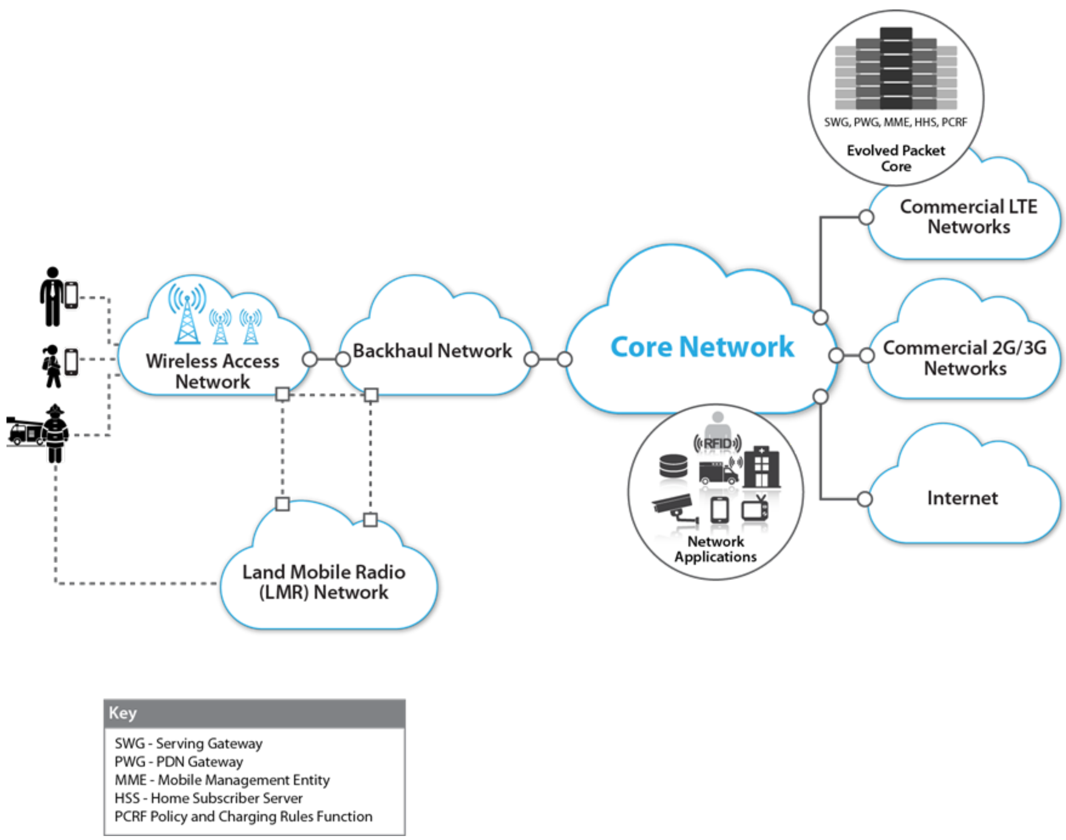
First Responder Personnel	Number
Police, Fire and Ambulance Dispatchers	5,200
Fire and Rescue Personnel	100,476
Law Enforcement Personnel	204,617
Emergency Medical Technicians and Paramedics	15,410

Sources: (National Fire Department Census, 2015) (BLS, 2015a) (Reaves, 2011)

11.1.1.5 Telecommunications Resources

Telecommunication resources in New York can be divided into two primary categories: specific public safety communications infrastructure and commercial telecommunications infrastructure (FCC, 2015a) (BLS, 2016). There is no central repository of information for either category; therefore, the following information and data are combined from a variety of sources, as referenced.

In general, the deployment of telecommunications resources in New York is widespread and similar to other states in the U.S. However, some areas of the state, such as the Adirondacks in the northern part of the state, have limited coverage. Communications throughout the state are based on a variety of publicly and commercially owned technologies, including coaxial cable (traditional copper cable), fiber optics, hybrid fiber optics/coaxial cable, microwave, wireless, and satellite systems providing voice, data, and video services (BLS, 2016). Table 11.1.1-2 presents a typical wireless configuration including both a narrowband public safety land mobile radio network (traditional radio network) and a commercial broadband access network (wireless technology); backhaul (long-distance wired or wireless connections), core, and commercial networks including a long term evolution (LTE) evolved packet core (modern broadband cellular networks); and network applications (software) delivering voice, data, and video communications. (FCC, 2016a).



Prepared by: Booz Allen Hamilton

Figure 11.1.1-2: Wireless Network Configuration

Public Safety Communications

In order to protect and best serve the public interest, first responder and law enforcement communities must be able to communicate effectively. The evolution of the communications networks used by public safety stakeholders toward a broadband wireless technology, such as LTE (see Section 2.1.1), has the potential to provide users with better coverage, while offering additional capacity and enabling the use of new applications that would likely make their work safer and more efficient. Designing such a network presents several challenges due to the uniqueness of the deployment, the requirements, and the nationwide scale (NIST, 2015).

Historically, there have been many challenges and impediments to timely and effective sharing of information, including jurisdictional challenges, funding challenges, the pace of technology evolution, and communication interoperability. Communication interoperability has been a persistent challenge, along with issues concerning spectrum availability, embedded infrastructure, and differing standards among stakeholders (NTFI, 2005). This has caused a fragmented approach to communications implementation across the U.S. and at the state level, including in Connecticut. There are five key reasons why public safety agencies often cannot connect through existing communications (NTFI, 2005):

- Incompatible and aging communications equipment,
- Limited and fragmented funding,
- Limited and fragmented planning,
- A lack of coordination and cooperation, and
- Limited and fragmented radio spectrum.

New York has acutely experienced these challenges over the past 15 years due to several tragic events that have impacted the state, and for which first responders were mobilized. These tragic events include the historic attacks on New York City on September 11, 2001; the impact of Hurricane Sandy in 2012; and heavy snow storms that had a wide-spread impact on communities throughout the state. In the aftermath of these events, the state has undertaken ongoing rebuilding activities; enhancing planning and coordination across federal, state, and local agencies; examining the resiliency of infrastructure and buildings; and addressing communications and interoperability through various efforts (PSCR, 2015).

To enable the public safety community to incorporate disparate Land Mobile Radio networks into a nationwide public safety LTE broadband network, Department of Commerce's (DOC) Public Safety Communications Research Program (PSCR) – Boulder Laboratories prepared a locations-based services (LBS) research and development roadmap to examine "the current state of location-based technologies, forecast the evolution of LBS capabilities and gaps, and identify potential Research and Development (R&D) opportunities that would improve the public safety community's use of LBS within operational settings" (PSCR, 2015). This is the first of several technology roadmaps that PSCR plans to develop over the next few years (PSCR, 2015).

Public safety communications in New York are similar to those in other states and consist of a mix of older analog[2] and digital[3] narrowband networks with newer digital broadband capabilities on a county-by-county basis. In 2005, New York invested in public safety communications through the New York Statewide Wireless Network (SWN). The SWN project was developed to upgrade older or obsolete communications infrastructure across the state, including development of a state-wide public safety radio network (NYOSC, 2006). Although some progress was made to upgrade the state systems, New York terminated the contract with the provider in 2009 due to

[2] Analog networks are those based on circuit-switching, which establishes a connection and then maintains it through the whole communication. Although now digitized, the nation's original telephone system is an example of an analog network.
[3] Digital networks are those that allow for simultaneous digital transmission of voice, data, video, and other network services over the traditional public-switched telephone network, or over new 3G, 4G, or LTE wireless networks.

implementation challenges. New York then moved to a new governance structure with more first responder participation, recognition of regional deployments, and calls for regional and state cooperation (NY Office of Information Technology Services, 2008).

Today, the principal state agency for all interoperable and emergency communications matters is the New York Division of Homeland Security and Emergency Services (NYDHSES), Office of Interoperable and Emergency Communications (OIEC). The OIEC coordinates and implements the Statewide Interoperable Communications Grant (SICG) Program, providing grants to New York counties for emergency/interoperability projects. OIEC has awarded approximately $225M through four SICG rounds of grants to New York counties for a variety of approved projects, advancing newer digital and broadband capabilities on a county-by-county basis (NYDHSES OIEC, 2015).

Commercial Telecommunications Infrastructure

New York's commercial telecommunications industry and infrastructure is robust with multiple service providers, offering products and services via the full spectrum of telecommunications technologies (FCC, 2014a) (FCC, 2014b). The following sub-sections present information on New York's commercial telecommunications infrastructure, including information on the number of carriers and technologies deployed; geographic coverage; voice, Internet access, and wireless subscribers; and the quantity and location of telecommunications towers, fiber optic plant, and data centers.

Carriers, Coverage, and Subscribers

As described earlier, New York's commercial telecommunications industry provides the full spectrum of telecommunications technologies and networks. Table 11.1.1-7 presents the number of providers of switched access[4] lines, Internet access[5], and mobile wireless services including coverage. Figure 11.1.1-3 maps the full spectrum of broadband/Internet access services available in the state, while Figure 11.1.1-4 maps the availability of 2G[6]/3G[7] and 4G[8] mobile wireless services.

[4] "A service connection between an end user and the local telephone company's switch; the basis of plain old telephone services (POTS)." (FCC, 2014b)
[5] Internet access includes DSL, cable modem, fiber, satellite, and fixed wireless providers.
[6] Second generation (2G) systems used digital radio technology with advanced messaging and data capabilities. (Althos, 2015)
[7] Third generation (3G) systems use wideband digital radio technology as compared to 2nd generation narrowband digital radio. (Althos, 2015)
[8] Fourth generation (4G) systems use broadband packet data digital radio technology which can mix voice, data, and high-speed multimedia Internet services. (Althos, 2015)

Table 11.1.1-7: Telecommunications Access Providers and Coverage in New York as of December 31, 2013

Commercial Telecommunications Access Providers	Number of Service Providers	Coverage
Switched access lines	206	98% of households
Internet access	97	77% of households
Mobile wireless	5	109% of population

Sources: (FCC, 2014a) (FCC, 2014b) (NTIA, 2014)

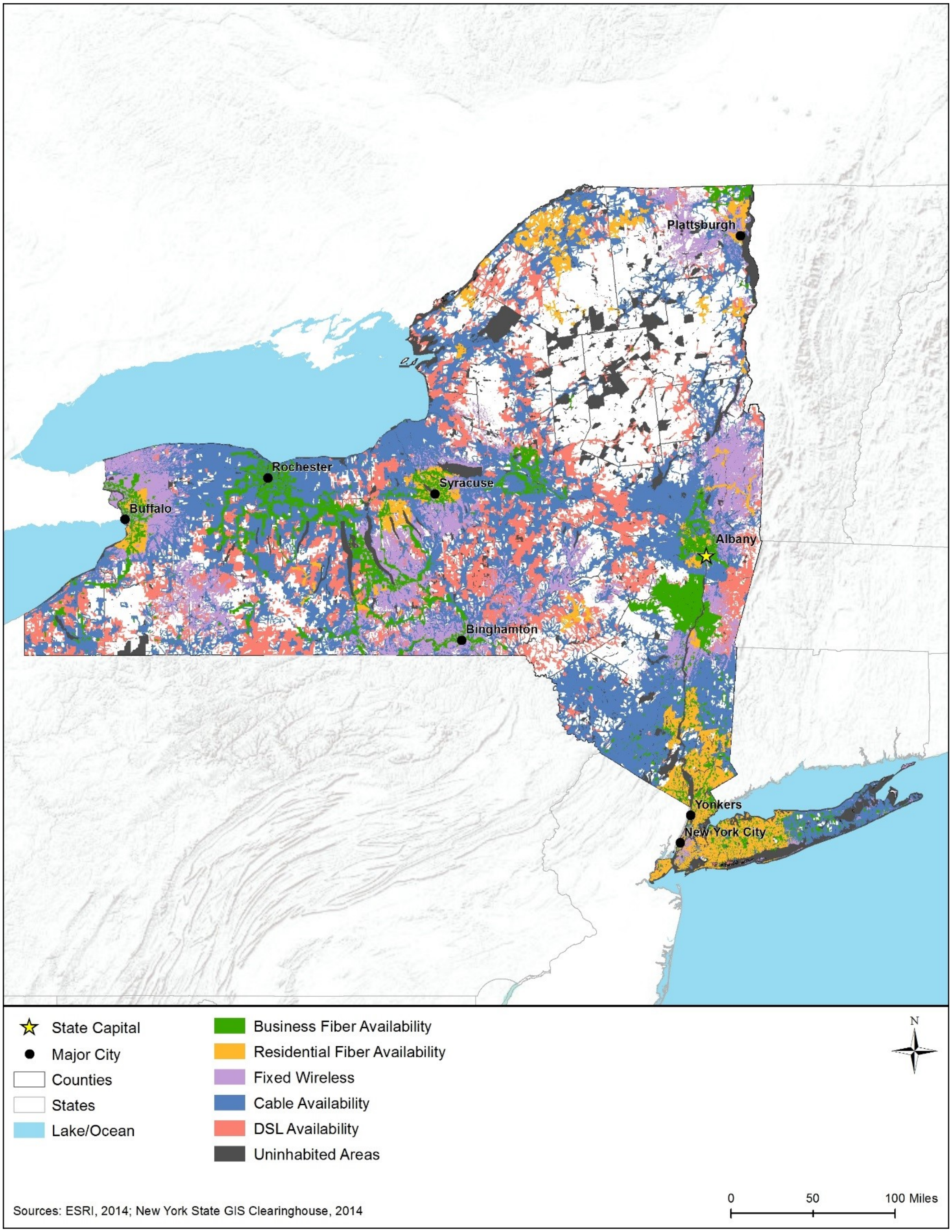


Figure 11.1.1-3: Technology Availability in New York

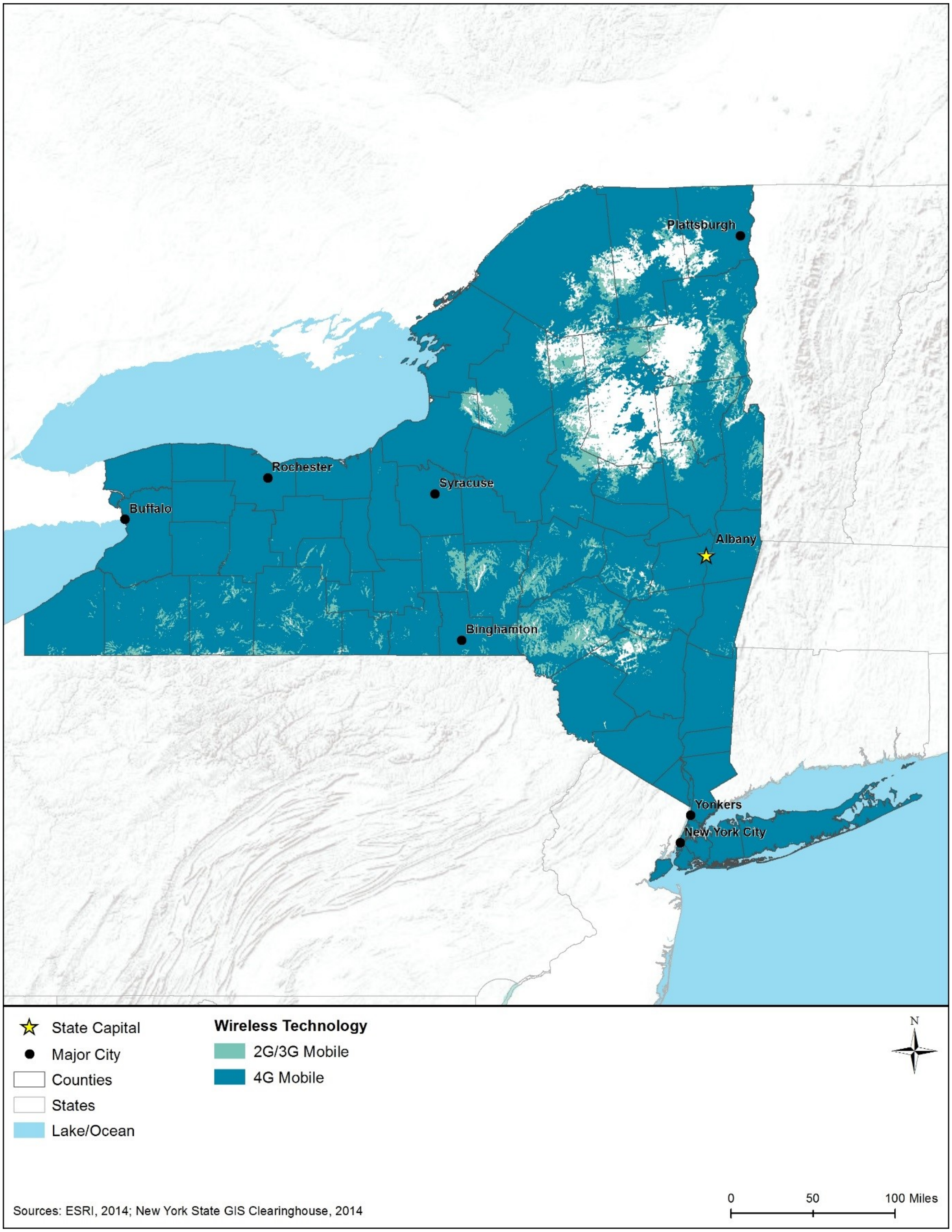


Figure 11.1.1-4: Wireless Technology in New York

Towers

There are many types of domestic towers employed today by the telecommunications industry, government agencies, and other owners. Towers are designed and used for a variety of purposes, and the height, location, and supporting structures and equipment are all designed, constructed, and operated according to the technical specifications of the spectrum used, the type of equipment mounted on the tower, geographic terrain, need for line-of-sight transmissions to other towers, radio frequency needs, and other technical specifications. There are three general categories of stand-alone towers: monopole, lattice, and guyed. Typically, monopole towers are the smallest, followed by lattice towers at a moderate height, and guyed towers at taller heights (with the guyed wires providing tension support for the taller heights) (CSC, 2007). In general, taller towers can provide communications coverage over larger geographic areas, but require more land for the actual tower site, whereas shorter towers provide less geographic coverage and require less land for the tower site (USFS, 2009a). Figure 11.1.1-5 presents representative examples of each of these categories or types of towers.

Monopole
100 – 200 feet
Source: http://laps.noaa.gov/birk/laps_intranet/site_photos/Monarch/tower.jpg

Lattice
200 – 400 feet
Source: Personal Picture

Guyed
200 – 2,000 feet
Source: http://www.esrl.noaa.gov/gmd/ccgg/insitu/

Figure 11.1.1-5: Types of Towers

Telecommunications tower infrastructure can be found throughout New York, although tower infrastructure is concentrated in the higher and more densely populated areas of New York City, Albany, Syracuse, Rochester, and Buffalo. Owners of towers and some types of antennas are required to register those infrastructure assets with the Federal Communications Commission (FCC) (FCC, 2016b).[9] Table 11.1.1-8 presents the number of towers (including broadcast towers) registered with the FCC in New York. Figure 11.1.1-6 presents the location of those 1,729 structures, as of June 2015.

[9] An antenna structure must be registered with the FCC if the antenna structure is taller than 200 feet above ground level or may interfere with the flight path of a nearby airport. (FCC, 2016b)

Table 11.1.1-8: Number of Commercial Towers in New York by Type

Constructed[a] Towers[b]		Constructed Monopole Towers	
100ft and over	125	100ft and over	0
75ft – 100ft	392	75ft – 100ft	0
50ft – 75ft	456	50ft – 75ft	3
25ft – 50ft	429	25ft – 50ft	38
25ft and below	78	25ft and below	7
Subtotal	**1,480**	**Subtotal**	**48**
Constructed Guyed Towers		**Buildings with Constructed Towers**	
100ft and over	11	100ft and over	12
75ft – 100ft	16	75ft – 100ft	2
50ft – 75ft	14	50ft – 75ft	4
25ft – 50ft	3	25ft – 50ft	4
25ft and below	0	25ft and below	4
Subtotal	**44**	**Subtotal**	**26**
Constructed Lattice Towers		**Multiple Constructed Structures[c]**	
100ft and over	5	100ft and over	2
75ft – 100ft	21	75ft – 100ft	0
50ft – 75ft	40	50ft – 75ft	2
25ft – 50ft	14	25ft – 50ft	2
25ft and below	1	25ft and below	0
Subtotal	**81**	**Subtotal**	**6**
Constructed Tanks[d]			
Tanks	44		
Subtotal	**44**		
Total All Tower Structures		**1,729**	

Source: (FCC, 2015b)

[a] Planned construction or modification has been completed. Results will return only those antenna structures that the FCC has been notified are physically built or planned modifications/alterations to a structure have been completed (FCC, 2013)

[b] Free standing or guyed structure used for communication purposes (FCC, 2013)

[c] Multiple constructed structures per antenna registration (FCC, 2013)

[d] Any type of tank – water, gas, etc. with a constructed antenna (FCC, 2013)

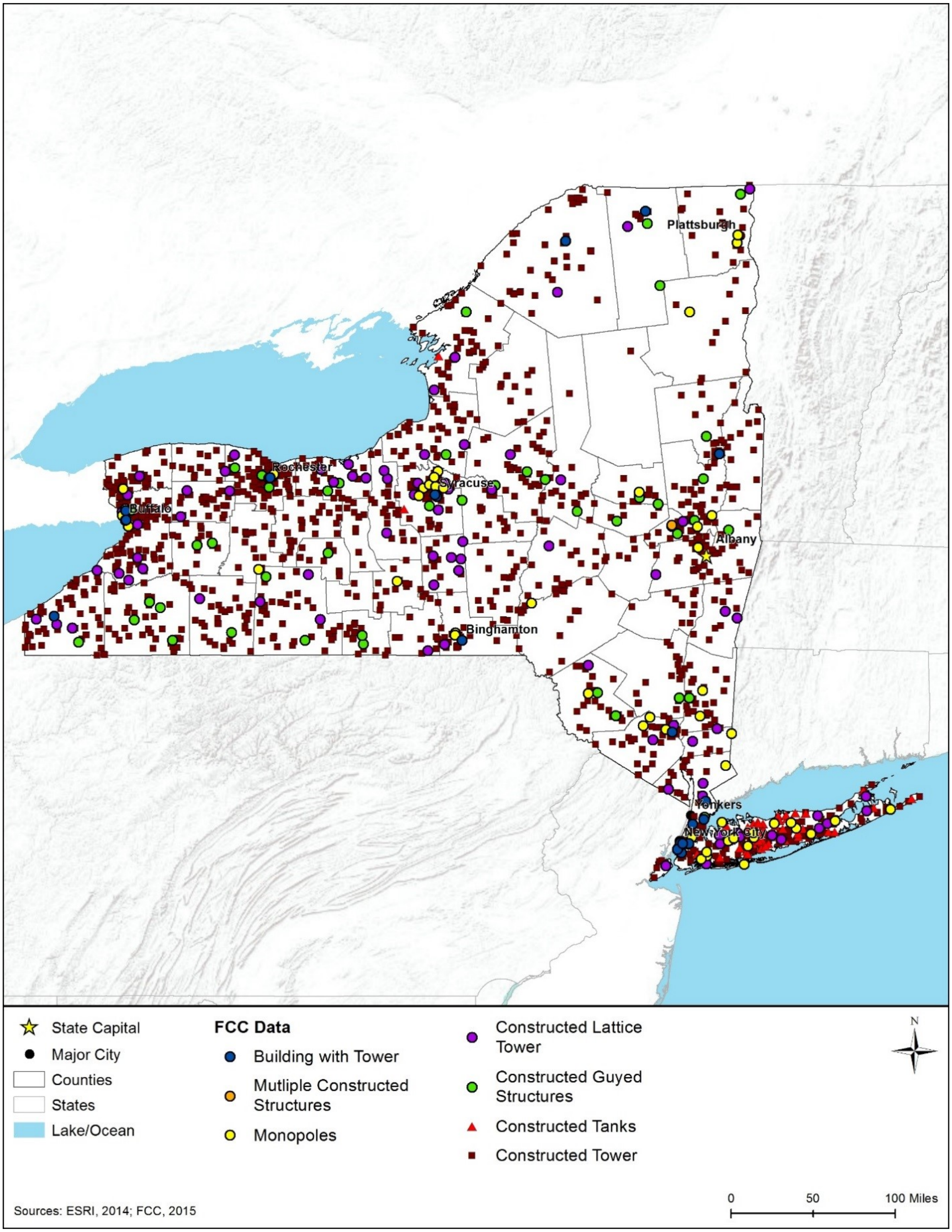
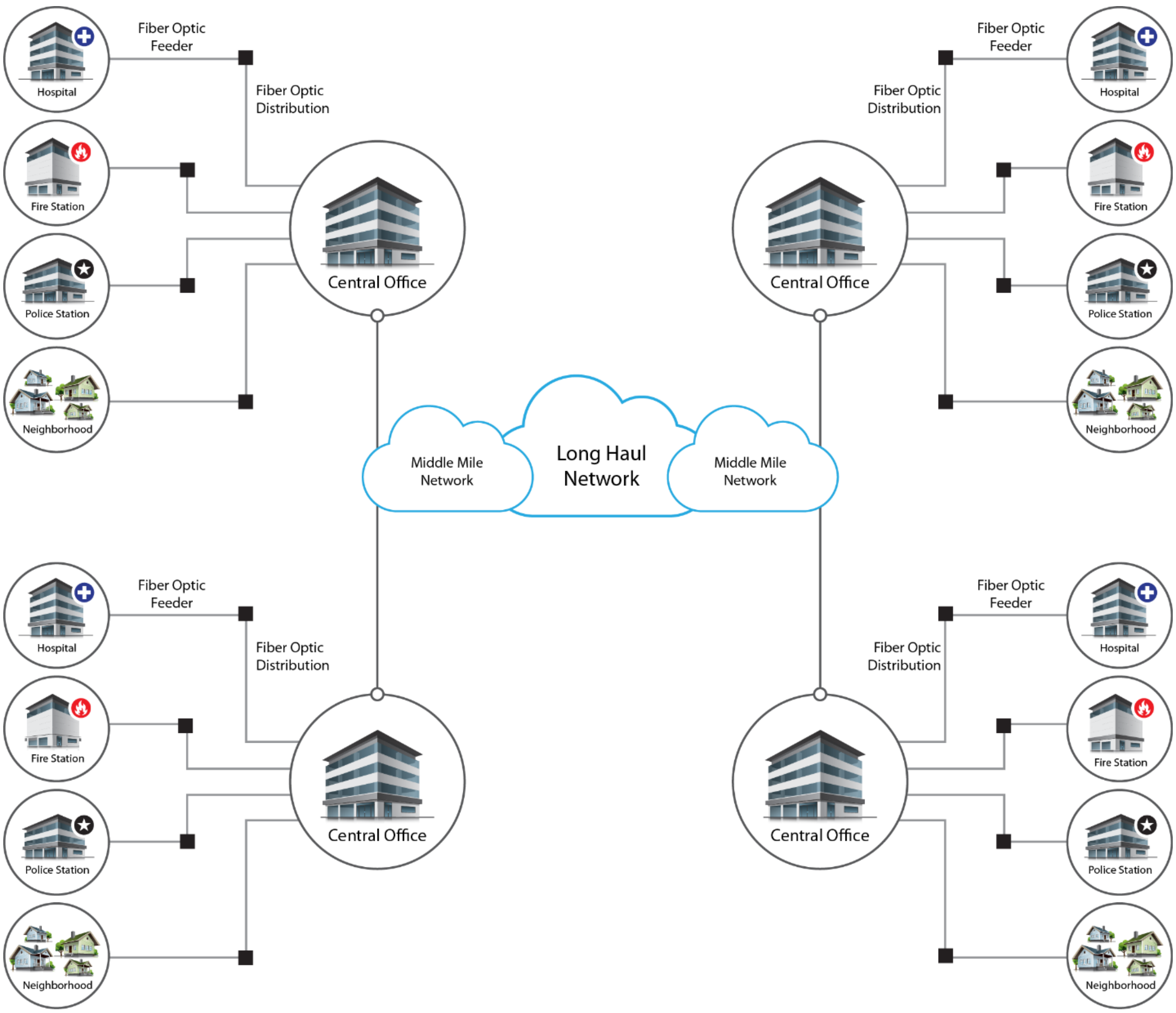


Figure 11.1.1-6: FCC Tower Structure Locations in New York

Fiber Optic Plant (Cables)

Fiber optic plant, or cables, can be buried directly in the ground; pulled, blown, or floated into ducts, conduits, or innerduct (flexible plastic protective sleeves or tubes); placed under water; or installed aerially between poles, typically on utility rights-of-way. A fiber optic network includes an access network consisting of a central office, distribution and feeder plant (cables of various sizes directly leaving a central office and splitting to connect users to the network), and a user location, as shown in Figure 11.1.1-7. The network also may include a middle mile component (shorter distance cables linking the core network between central offices or network nodes across a region) and a long haul network component (longer distance cables linking central offices across regions) (FCC, 2000).



Prepared by: Booz Allen Hamilton

Figure 11.1.1-7: Typical Fiber Optic Network in New York

Last Mile Fiber Assets

In New York, fiber access networks are concentrated in the highest population centers as shown in Figure 11.1.1-8. Figure 11.1.1-3 shows all the broadband technologies available throughout the state. Approximately 13.2 percent of the state's land area is connected via fiber access networks.

Data Centers

Data centers (also known as network access points, collocation facilities, hosting centers, carrier hotels, and Internet exchanges) are large telecommunications facilities that house routers, switches, servers, storage, and other telecommunications equipment. These data centers facilitate efficient network connectivity among and between telecommunications carriers and between carriers and their largest customers. These facilities also provide racks and cages for equipment, power and cooling, cabling, physical security, and 24x7 monitoring (CIO Council, 2015; GAO, 2013).

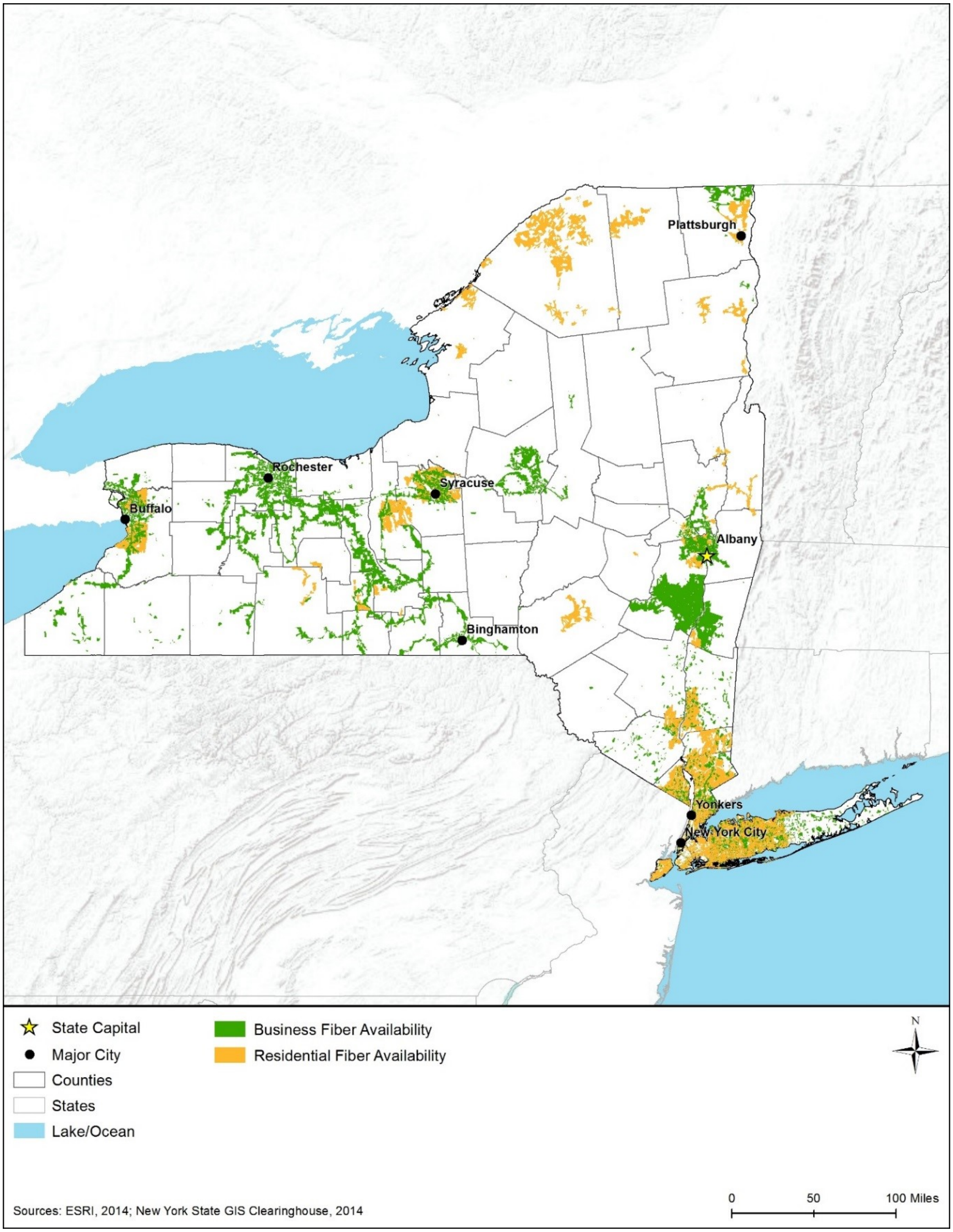


Figure 11.1.1-8: Broadband Fiber Access

11.1.1.6 Utilities

Utilities are the essential systems that support daily operations in a community and cover a broad array of public services, such as electricity, water, wastewater, and solid waste. Section 11.1.4, Water Resources, describes the potable water sources in the state.

Electricity

The New York Power Authority (NYPA) is the largest public electricity provider in the U.S., supplying electricity to 51 cooperative or municipal electrical service providers, who then sell the electricity to the public. The NYPA also provides power to investor-owned utility companies to sell electricity to their customers, without any increase in price; these investor-owned utility companies are regulated by the New York Public Service Commission (NYPA, 2012). The NYPA owns and maintains approximately a third of New York's high voltage lines, contained in over 1,400 circuit-miles of transmission facilities. Other transmission lines are owned by private companies. The NYPA is engaged in a $726M effort to modernize its transmission equipment, entitled the Life Extension and Modernization (LEM), intended to last until 2025. Other initiatives include the Marcy-South Series Compensation Project, which relieves electricity congestion (insufficient energy to meet the demands of all customers), in transmission between Central New York and the Catskills by increasing the amount of power flowing through current lines (NYPA, 2015). According to the Energy Information Agency (EIA), "New York's Robert Moses Niagara hydroelectric power plant is the largest hydroelectric power plant east of the Rocky Mountains" (EIA 2015a).

The price of electricity in New York has risen over the last several years. In 2014, the average retail price of one kilowatt hour (kWh)[10] of electricity was 16.25 cents. This was an increase from 2013 and 2012, where prices were 15.44 cent/kWH and 15.15 cent/kWH respectively. The prices in New York have been higher than the U.S. averages annually, which were 10.45 cent/kWh, 10.12 cent/kWh, and 9.84 cent/kWh in 2014, 2013, and 2012, respectively (EIA, 2015b). New York's electricity generation has stayed relatively constant over the last several years. In 2014, the state produced a total of 136,275,000 megawatt hours (MWh)[11] of electricity. This is in comparison to 136,117.000 MWh in 2013, 135,768,000 MWh in 2012 and 137,480,000 MWh in 2011. The largest portions of electricity were generated from nuclear power and the combustion of natural gas (EIA, 2015c).

New York is making progress towards its goal of installing "3,000 megawatts of small-scale (less than 200 kilowatts)[12] solar photovoltaic facilities by 2023," which would boost renewable energy production (EIA 2015a). In the first four months of 2015, the majority of New York's electricity has comes from two sources: nuclear power and the combustion of natural gas. Nuclear power generated 3,721 gigawatt hours (GWh)[13] of electricity and natural gas generated 3,575 GWh. Hydroelectric power generated 2,116 GWh, while 585 GWh came from other

[10] A Watthour (Wh) is defined as "The electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour." (EIA, 2015d) Therefore, a Kilowatt hour (kWh) can be defined as "A measure of electricity defined as a unit of work or energy, measured as 1 kilowatt (1,000 watts) of power expended for 1 hour." (EIA, 2015e)
[11] A Megawatt hour (MWh) is defined as "One thousand kilowatt-hours or 1million watt-hours." (EIA, 2015f)
[12] A Kilowatt (kW) is defined as "One thousand watts." (EIA, 2015g)
[13] A Gigawatt hour (GWh) is defined as "One billion watthours." (EIA, 2015h)

renewable sources. Information from 2013 indicates that commercial consumers use the largest portion of energy at 31.3 percent. Transportation consumers, such as mass transit solutions, accounted for 28.8 percent, residential consumers for 29.6 percent, and industrial consumers for 10.4 percent (EIA 2015a).

New York's electricity business is undergoing a transition period with the New York Public Service Commission starting Initiative 14-M-0101, Reforming the Energy Vision (REV), to transform the way the state produces and regulates electricity. This initiative promotes the use of renewable energy resources, such as wind and solar energy, and aims to enhance efficiency of energy use and provide customers with multiple options for electricity consumption (NYSDPS, 2015a). There are 47 electric utility companies regulated by the New York Public Service Commission under this initiative (NYSDPS, 2014).

Water

Drinking water throughout New York is provided by several large reservoirs to the over nineteen million customers in the state (NYCDEP, 2015a). Section 11.1.4, Water Resources, provides information on the groundwater sources in New York that provide water to meet the daily needs of the state. In addition to these reservoirs, there are 277 regulated private water companies in New York. With regulated rates and services, these private water companies are small (50 to 100 customers) serving an estimated 800,000 people across the state (NYSDPS, 2015b). Public water suppliers are required to complete an Annual Water Quality Report each year, which details sources of water, levels of contaminants in finished drinkable water, information on unregulated contaminants like radon, violations of national primary drinking water regulations, and other related information. These reports are posted online for suppliers that service over 100,000 people, while reports for smaller service providers can be found through Department of Health District Offices, local public health departments, or the water supplier themselves (NYSDOH, 2015a).

Wastewater

Wastewater is water that contains waste products from homes, industries, and businesses. Before being released back into the environment, this used water must be treated to remove contaminants. Wastewater treatment plants in New York are certified by the New York State Department of Environmental Conservation (NYSDEC) (NYSDEC 2015a). New York has 87 certified wastewater treatment operators; New York City alone has 14 treatment plants to handle the 1.3 billion gallons of wastewater that must be treated daily (NYCDEP, 2015b). Overall, New York's wastewater treatment facilities service over 15 million people through the operation of 610 wastewater treatment facilities across the state (NYCDEP, 2015c). Rural areas are usually serviced by various types of septic systems.

Failing treatment facilities are a concern; evidence indicates that of the 610 wastewater treatment facilities in New York, almost 25 percent are being used past their intended life expectancy or lack current technology treatments. An estimated 27 billion gallons of untreated sewage flow into New York Harbor each year when older sewers are flooded with stormwater. With decreased funding from the federal government in recent years, the state is working to identify new funding sources to aid in the restoration of New York's wastewater treatment facilities (NYSDEC, 2015d).

Solid Waste Management

Solid waste is the garbage, refuse, and sludge resulting from various treatment plants processing waste from homes, industries, businesses, mining, and agricultural operations. The NYSDEC regulates and oversees facilities that handle solid or hazardous waste (NYSDEC, 2015e). These facilities include those that process construction and demolition debris, handle household hazardous wastes or metal salvage, solid waste landfills, and recycling facilities. Some facilities combust waste materials to create electricity or steam, whereas other facilities are designed to transfer solid waste from one facility to another for continued processing (NYSDEC, 2015f).

New York maintains 27 municipal solid waste landfills across the state for solid waste that cannot be reused or recycled. As reported in 2010, these landfills have an unused capacity of close to 220 million tons (NYSDEC, 2015g). New York City's sanitation department picks up more than 10,500 tons of garbage each day (New York City Department of Sanitation, 2015). The state has 119 municipal recycling programs listed by Empire State Development, New York's economic development agency (Empire State Development, 2015). There are also 82 recycling facilities designed to handle electronic waste registered under the New York State (NYS) Electronic Equipment Recycling and Reuse Act (NYSDEC, 2015h).

11.1.2 Soils

11.1.2.1 Definition of the Resource

The Soil Science Society of America defines soil as:

(i) "The unconsolidated mineral or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants." (NRCS, 2015a)

(ii) "The unconsolidated mineral or organic matter on the surface of the Earth that has been subjected to and shows effects of genetic and environmental factors of: climate (including water and temperature effects), and macro- and microorganisms, conditioned by relief, acting on parent material over a period of time. A product-soil differs from the material from which it is derived in many physical, chemical, biological, and morphological properties and characteristics." (NRCS, 2015a)

Five primary factors account for soil development patterns. A combination of the following variables contributes to the soil type in a particular area (University of Minnesota, 2001):

- *Parent Material*: The original geologic source material from the soil formed affects soil aspects, including color, texture, and ability to hold water.
- *Climate*: Chemical changes in parent material occur slowly in low temperatures. However, hot temperatures evaporate moisture, which also facilitates chemical reactions within soils. The highest degree of reaction within soils occurs in temperate, moist climates.

- *Topography*: Steeper slopes produce increased runoff, and, therefore, downslope movement of soils. Slope orientation also dictates the microclimate to which soils are exposed, because different slope faces receive more sunlight than others.
- *Biology*: The presence/absence of vegetation in soils affects the quantity of organic content of the soil.
- *Time*: Soil properties are dependent on the period over which other processes act on them.

11.1.2.2 Specific Regulatory Considerations

The Proposed Action must meet the requirements of National Environmental Policy Act (NEPA) and other applicable laws and regulations. Applicable federal laws and regulations that apply for Soils, such as the Farmland Protection Policy Act of 1981, are in Section 1.8. A list of applicable state laws and regulations is included in Table 11.1.2-1 below.

Table 11.1.2-1: Relevant New York Soil Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
New York Standards and Specifications for Erosion and Sediment Control	New York State Department of Environmental Conservation (NYSDEC)	Provides standards and specifications for selection, design, and implementation of erosion and sediment control practices.
6 NYCRR Part 505 Coastal Erosion Management	NYSDEC	Provides regulations for coastal erosion hazard areas and establishes standards for the issuance of coastal erosion management permits.

11.1.2.3 Environmental Setting

New York is composed of four Land Resource Region (LRR),[14] as defined by the Natural Resources Conservation Service (NRCS) (NRCS, 2006):

- Lake States Fruit, Truck Crop, and Dairy Region,
- Northeastern Forage and Forest Region,
- Northern Atlantic Slope Diversified Farming Region, and
- East and Central Farming and Forest Region.

Within and among New York's four LRRs are 10 Major Land Resource Areas (MLRA),[15] which are characterized by patterns of soils, climate, water resources, land uses, and type of farming. The locations and characteristics of New York's MLRAs are presented in Figure 11.1.2-1 and Table 11.1.2-2, respectively.

Soil characteristics are an important consideration for FirstNet insomuch as soil properties could influence the suitability of sites for network deployment. Soil characteristics can differ over relatively short distances, reflecting differences in parent material, elevation and position on the landscape, biota[16] such as bacteria, fungi, biological crusts, vegetation, animals, and climatic

[14] Land Resource Region: "A geographical area made up of an aggregation of Major Land Resource Areas (MLRA) with similar characteristics." (NRCS, 2006)
[15] Major Land Resource Area "A geographic area, usually several thousand acres in extent, that is characterized by a particular pattern of soils, climate, water resources, land uses, and type of farming." (NRCS, 2006)
[16] The flora and fauna of a region.

variables such as precipitation and temperature. For example, expansive soils[17] with wet and dry seasons alternately swell and shrink, which presents integrity risks to structural foundations (Rogers, Olshansky, & Rogers, 2004). Soils can also be affected by a variety of surface uses that loosen topsoil and damage or remove vegetation or other groundcover, which may result in accelerated erosion, compaction, and rutting[18] (discussed further in the subsections below).

11.1.2.4 Soil Suborders

Soil suborders are part of the soil taxonomy (a system of classification used to make and interpret soil surveys). Soil orders are the highest level in the taxonomy; there are twelve soil orders in the world and they are characterized by both observed and inferred[19] properties, such as texture, color, temperature, and moisture regime. Soil suborders are the next level down, and are differentiated within an order by soil moisture and temperature regimes, as well as dominant physical and chemical properties (NRCS, 2015c). The STATSGO2[20] soil database identifies 13 different soil suborders in New York (NRCS, 2015d). Figure 11.1.2-2: New York Soil Taxonomy Suborders depicts the distribution of the soil suborders, and Table 11.1.2-3 provides a summary of the major physical-chemical characteristics of the various soil suborders found.

[17] Expansive soils are characterized by “the presence of swelling clay materials” that absorb water molecules when wet and expand in size or shrink when dry leaving “voids in the soil.” (Rogers, Olshansky, & Rogers, 2004)
[18] Rutting is indentations in soil from operating equipment in moist conditions or soils with lower bearing strength. (USFS, 2009b)
[19] “Soil properties inferred from the combined data of soil science and other disciplines (e.g., soil temperature and moisture regimes inferred from soil science and meteorology).” (NRCS, 2015c)
[20] STATSGO2 is the Digital General Soil Map of the United States developed by the National Cooperative Soil Survey and supersedes the State Soil Geographic (STATSGO) dataset; the U.S. General Soil Map is comprised of general soil association units and is maintained and distributed as a spatial and tabular dataset.

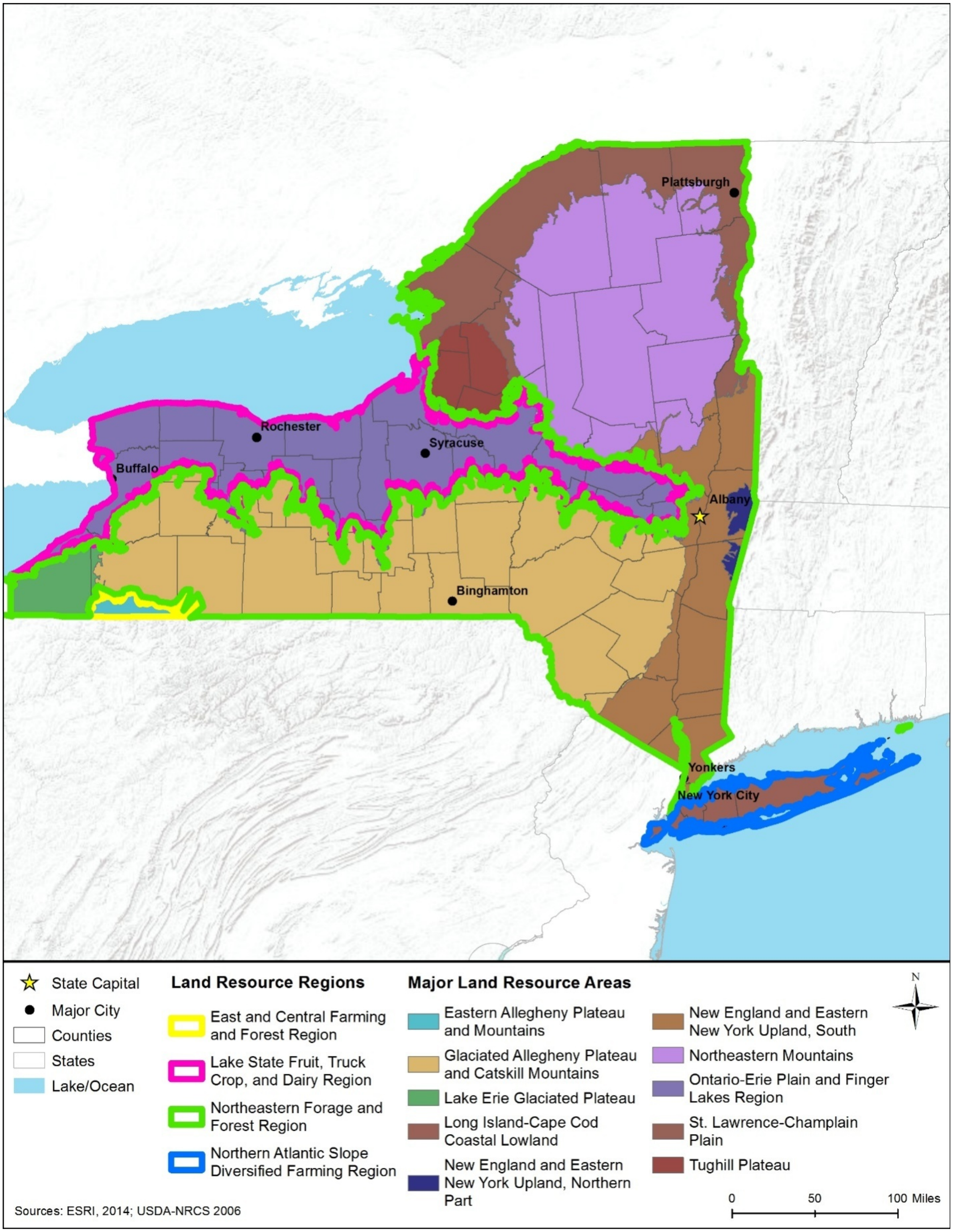


Figure 11.1.2-1: Locations of Major Land Resource Areas in New York

Table 11.1.2-2: Characteristics of Major Land Resource Areas in New York

MLRA Name	Region of State	Soil Characteristics
Eastern Allegheny Plateau and Mountains	Far southwest New York	Dominant soil orders in this MLRA include Ultisols[21] and Inceptisols[22], and the soils are generally moderately deep to very deep, excessively drained to somewhat poorly drained, and are loamy.
Glaciated Allegheny Plateau and Catskill Mountains	South-central New York	Inceptisols are the dominant soil order in this MLRA, and soils in this area are shallow to very deep, well drained to very poorly drained, and are loamy or loamy-skeletal.
Lake Erie Glaciated Plateau	Far western New York	Alfisols[23] are the dominant soil order in this MLRA, and soils in this area are very deep, well drained to poorly drained, and are loamy or clayey.
Long Island-Cape Cod Coastal Lowland	Long Island	Dominant soil orders are Inceptisols and Entisols[24]. The soils in this area are deep, with a moderately coarse texture or coarse texture, nearly level to sloping, and well drained.
New England and Eastern New York Upland, Northern Part	Extreme eastern New York, east of Albany	Inceptisols and Spodosols[25] are the dominant soil orders in this area, and the soils range from shallow to very deep, are generally excessively drained to poorly drained, and loamy or sandy.
New England and Eastern New York Upland, Southern Part	Eastern and southeastern New York	Dominant soil orders in this area include Entisols, Histosols[26], and Inceptisols. Soils in this MLRA are generally very deep, range from somewhat excessively drained to poorly drained, and are loamy or sandy.
Ontario-Erie Plain and Finger Lakes Region	Most of central New York, stretching from an area just west of Albany all the way to Buffalo, and includes the cities of Syracuse and Rochester	Alfisols and Inceptisols are the dominant soils in this MLRA, and are generally deep with a medium texture or moderately fine texture.
Northeastern Mountains	Northeast New York, and primarily includes the Adirondack Mountains	The dominant soil orders in this MLRA are Inceptisols and Spodosols, and the soils range from shallow to very deep, generally somewhat excessively drained to poorly drained, and are loamy.

[21] Ultisols: "Soils found in humid environments that are formed from fairly intense weathering and leaching processes. This results in a clay-enriched subsoil dominated by minerals. They have nutrients concentrated in the upper few inches and make up 8% of the world's ice-free land surface." (NRCS, 2015b)
[22] Inceptisols: "Soils found in semiarid to humid environments that exhibit only moderate degrees of soil weathering and development. They have a wide range of characteristics, can occur in a wide variety of climates, and make up nearly 17% of the world's ice-free land surface." (NRCS, 2015b)
[23] Alfisols: "Soils found in semiarid to moist areas that are formed from weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil. They are productive for most crop, are primarily formed under forest or mixed vegetative cover, and make up nearly 10% of the world's ice-free land surface." (NRCS, 2015b)
[24] Entisols: "Soils that show little to no pedogenic horizon development. They occur in areas of recently deposited parent materials or in dunes, steep slopes, or flood plains where erosion or deposition rates are faster than rate of soil development. They make up nearly 16% of the world's ice-free land surface." (NRCS, 2015b)
[25] Spodosols: "Soils formed from weathering processes that strip organic matter combined with aluminum from the surface layer and deposit them in subsoil. They commonly occur in areas of coarse-textured deposits under forests of humid regions, tend to be acid and infertile, and make up nearly 4% of the world's ice-free land surface." (NRCS, 2015b)
[26] Histosols: "Soils that have a high content of organic matter and no permafrost. Also known as bogs, moors, peats, or mucks, these soils are saturated year round and form in decomposed plant remains. If exposed to air and drained, the microbes will decompose and the soils can subside dramatically. They make up nearly 1% of the world's ice-free land surface." (NRCS, 2015b)

MLRA Name	Region of State	Soil Characteristics
St. Lawrence-Champlain Plain	Northeast New York	Alfisols, Inceptisols, Spodosols, and Entisols are all dominant soil orders in this area, and soils range from shallow to very deep, from excessively drained to very poorly drained, and from sandy to clayey.
Tughill Plateau	Entirely in New York, in a small area northeast of Syracuse, between Lake Ontario and the Adirondack Mountains	The dominant soil order in this MLRA is Spodosols, and most of the soils in this MLRA are very deep to bedrock, and are loamy or sandy, with varying amounts of gravel.

Source: (NRCS, 2006)

11.1.2.5 Runoff Potential

The NRCS uses four Hydrologic Soil Groups (A, B, C, and D) that are based on a soil's runoff potential.[27] Group A generally has the smaller runoff potential, whereas Group D generally has the greatest (Purdue University, 2015). Table 11.1.2-2 provides a summary of the runoff potential for each soil suborder in New York.

Group A. **Sand, loamy sand or sandy loam soils.** This group of soils has "low runoff potential and high infiltration rates[28] even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission" (Purdue University, 2015). Orthents, Orthods, Psamments, Saprists, Udalfs, and Udepts fall into this category in New York.

Group B. **Silt loam or loam soils.** This group of soils has a "moderate infiltration rate when thoroughly wetted and consists chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures" (Purdue University, 2015). This group has medium runoff potential. Orthods, Udalfs, Udepts, and Udults fall into this category in New York.

Group C. **Sandy clay loam soils.** This group of soils has "low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure" (Purdue University, 2015). This group has medium runoff potential. Aqualfs, Aquents, Aquepts, Aquods, Aquults, Cryods, Orthents, Orthods, Udalfs, Udepts, and Udults fall into this category in New York.

Group D. **Clay loam, silty clay loam, sandy clay, silty clay, or clay soils.** This group of soils "has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material" (Purdue University,

[27] Classifying soils is highly generalized and it is challenging to differentiate orders as soil properties can change with distance or physical properties. The soil suborders are at a high level, therefore soil groups may be found in multiple hydrologic groups within a state, as composition, topography, etc. varies in different areas.

[28] Infiltration Rate: "The rate at which a soil under specified conditions absorbs falling rain, melting snow, or surface water expressed in depth of water per unit time." (FEMA, 2010)

2015). Aqualfs, Aquents, Aquepts, Aquods, Orthents, Orthods, Saprists, and Udepts fall into this category in New York.

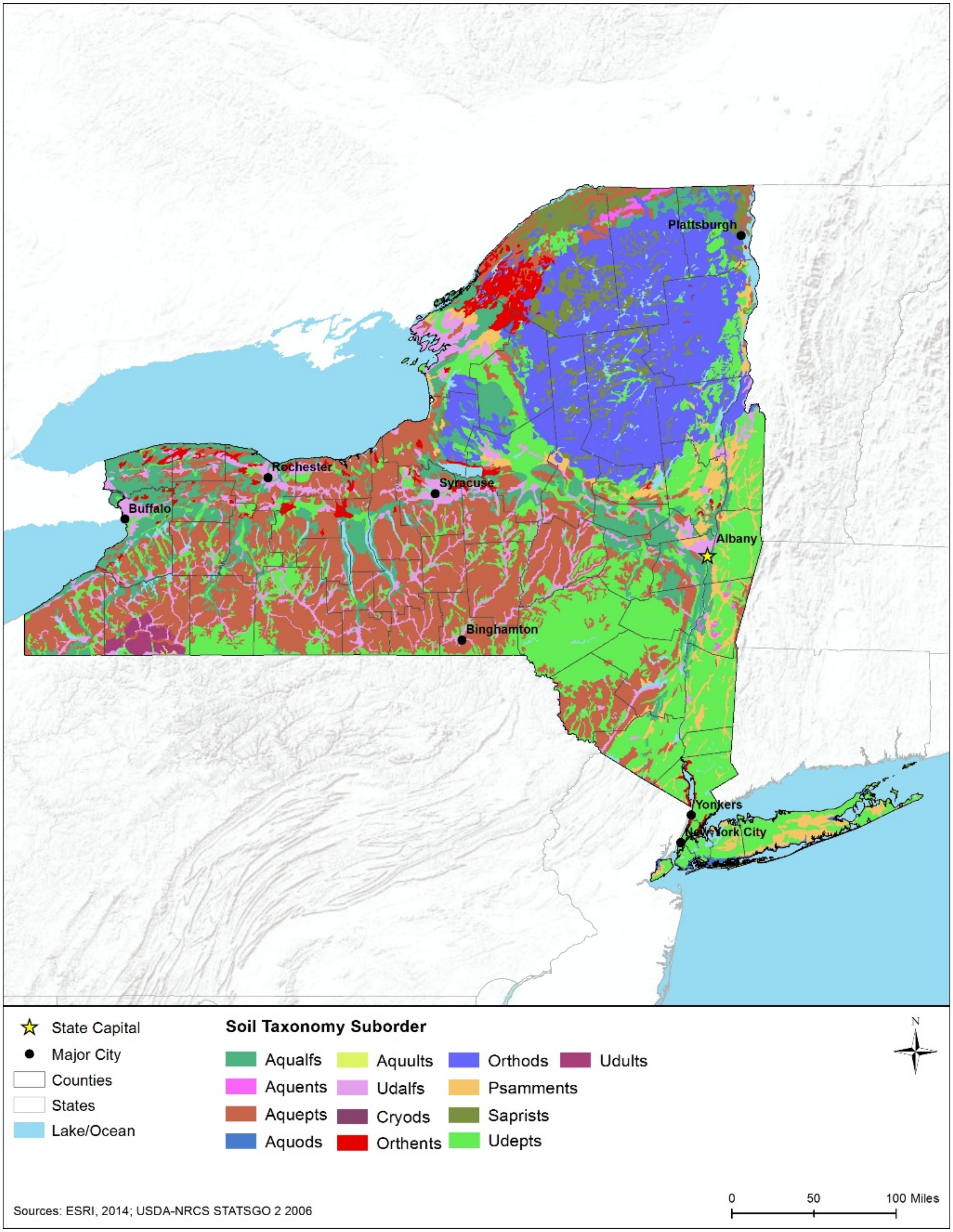


Figure 11.1.2-2: New York Soil Taxonomy Suborders

11.1.2.6 Soil Erosion

"Soil erosion involves the breakdown, detachment, transport, and redistribution of soil particles by forces of water, wind, or gravity" (NRCS, 2015e). Water-induced erosion can transport soil into streams, rivers, and lakes, degrading water quality and aquatic habitat. When topsoil is eroded, organic material is depleted, creating loss of nutrients available for plant growth. Soil particles displaced by wind can cause human health problems and reduced visibility, creating a public safety hazard (NRCS, 1996a). Table 11.1.2-2 (above) provides a summary of the erosion potential for each soil suborder in New York. Soils with the highest erosion potential in New York include those in the Aqualfs, Aquents, Aquepts, Aquods, Orthents, Orthods, Saprists, and Udepts suborders, which are found throughout most of the state (Figure 11.1.2-2).

11.1.2.7 Soil Compaction and Rutting

Soil compaction and rutting occurs when soil layers are compressed by machinery or animals, which decreases both open spaces in the soil, as well as water infiltration rates (NRCS, 1996b). Moist soils with high soil water content are most susceptible to compaction and rutting, as they lack the strength to resist deformation caused by pressure. When rutting occurs, channels form and result in downslope erosion (USFWS, 2009). Other characteristics that factor into compaction and rutting risk include soil composition (i.e. low organic soil is at increased risk of compaction), amount of pressure exerted on the soil, and repeatability (i.e., the number of times the pressure is exerted on the soil). Machinery and vehicles that have axle loads greater than 10 tons can cause soil compaction of greater than 12 inches depth (NRCS, 1996b), (NRCS, 2003).

Loam, sandy loam, and sandy clay loam soils are most susceptible to compaction and rutting; silt, silty clay, silt loam, silty clay loam, and clay soils are more resistant to compaction and rutting (NRCS, 1996b). Table 11.1.2-3 provides a summary of the compaction and rutting potential for each soil suborder in New York. Soils with the highest potential for compaction and rutting in New York include those in the Aqualfs, Aquents, Aquepts, Aquods, and Saprists suborders, which are found primarily in central and western areas of the state (Figure 11.1.2-2).

Table 11.1.2-3: Major Characteristics of Soil Suborders Found in New York, as depicted in Figure 11.1.2-2

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[29]	Hydrologic Group	Runoff Potential	Permeability[30]	Erosion Potential	Compaction and Rutting Potential
Alfisols	Aqualfs	Generally have warm and aquic (saturated with water long enough to cause oxygen depletion) conditions. Aqualfs are used as cropland for growing corn, soybeans, and rice; and most have some artificial drainage or other water control. Nearly all Aqualfs have likely supported forest vegetation in the past.	Gravelly loam, silt loam, silty clay, silty clay loam, stratified very fine sand to silt, very fine sandy loam, weathered bedrock	0-15	Poorly drained to somewhat poorly drained	No, Yes	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Entisols	Aquents	Widely distributed, with some forming in sandy deposits, and most forming in recent sediments. Aquents support vegetation that tolerates either permanent or periodic wetness, and are mostly used for pasture, cropland, forest, or wildlife habitat.	Loamy sand, silt loam	0-3	Somewhat poorly drained	No, Yes	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Inceptisols	Aquepts	Aquepts have poor or very poor natural drainage. If these soils have not been artificially drained, groundwater is at or near the soil surface at some time during normal years (although not usually in all seasons). They are used primarily for pasture, cropland, forest, or wildlife habitat. Many Aquepts have formed under forest vegetation, but they can have almost any kind of vegetation.	Channery silt loam, channery silty clay loam, fine sandy loam, gravelly find sandy loam, gravelly loam, sandy loam, silt loam, silty clay loam, stratified gravelly fine sandy loam to silt loam, stratified very gravelly coarse sand to loamy fine sand, very fine sandy loam	0-15	Very poorly drained to poorly drained	No, Yes	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Spodosols	Aquods	Aquods are characterized by a shallow fluctuating water table, with water-loving vegetation, ranging from moss, shrubs, and trees in cold areas to mixed forests and palms in the warmest areas. Although some Aquods have been cleared and are used as cropland or pasture, most are used as forest or wildlife habitat, as they are naturally infertile (but they can be highly responsive to good management).	Loamy fine sand, sand	0-8	Poorly drained	Yes	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Ultisols	Aquults	Aquults are found in wet areas where groundwater is very close to the surface during part of each year, usually in winter and spring. Their slopes are gentle, with many soils formerly and currently supporting forest vegetation.	Silt loam	8-15	Somewhat poorly drained	No	C	Medium	Low	Medium, depending on slope	Low
Spodosols	Cryods	Cryods are soils of high latitudes and/or high elevations, with coniferous forest vegetation, and are used as forest or wildlife habitat.	Sandy loam	15-35	Moderately well drained	No	C	Medium	Low	Medium, depending on slope	Low
Entisols	Orthents	Orthents are commonly found on recent erosional surfaces and are used primarily as rangeland, pasture, or wildlife habitat.	Gravelly sandy loam, loamy fine sand, stratified cobbly coarse sand to very gravelly loamy fine sand, unweathered bedrock	0-25	Somewhat poorly drained to excessively drained	No	A, C, D	Low, Medium, High	High, Low, Very Low	Low to High, depending on slope	Low
Spodosols	Orthods	Orthods have a moderate accumulation of organic carbon, and are relatively freely drained. Most of these soils are either used as forest or have been cleared and are used as cropland or pasture. Although they are naturally infertile, they can be highly responsive to good management.	Channery fine sandy loam, fine sandy loam, gravelly fine sandy loam, gravelly sand, gravelly sandy loam, loam, loamy fine sand, loamy sand, sandy loam, silt loam	0-35	Moderately well drained to excessively drained	No	A, B, C, D	Low, Medium, High	High, Moderate, Low, Very Low	Low to High, depending on slope	Low

[29] Hydric Soil: "A soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part." (NRCS, 2015f)
[30] Based on Runoff Potential, described in Section 11.1.2.5.

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[29]	Hydrologic Group	Runoff Potential	Permeability[30]	Erosion Potential	Compaction and Rutting Potential
Entisols	Psamments	Psamments are sandy in all layers. In some arid and semi-arid climates, they are among the most productive rangeland soils, and are primarily used as rangeland, pasture, or wildlife habitat. Those Psamments that are nearly bare are subject to wind erosion and drifting, and do provide good support for wheeled vehicles.	Coarse sand, loamy fine sand, loamy sand, sand	0-25	Well drained to excessively drained	No	A	Low	High	Low, depending on slope	Low
Histosols	Saprists	Saprists have organic materials are well decomposed, and many support natural vegetation and are used as woodland, rangeland, or wildlife habitat. Some Saprists, particularly those with a mesic or warmer temperature regime, have been cleared, drained, and used as cropland.	Muck, mucky peat	0-2	Very poorly drained	Yes	A, D	Low, High	High, Very Low	Low to High, depending on slope	High, due to hydric soil and poor drainage conditions
Alfisols	Udalfs	Udalfs have a udic (humid or subhumid climate) moisture regime, and are believed to have supported forest vegetation at some time during development.	Gravelly fine sandy loam, gravelly loam, gravelly silt loam, gravelly silty clay loam, silty clay, silty clay loam, very gravelly loam	0-35	Somewhat poorly drained to well drained	No	A, B, C	Low, Medium	High, Moderate, Low	Low to Medium, depending on slope	Low
Inceptisols	Udepts	Udepts have a udic or perudic (saturated with water long enough to cause oxygen depletion) moisture regime, and are mainly freely drained. Most of these soils currently support or formerly supported forest vegetation, with mostly coniferous forest in the northwest and mixed or hardwood forest in the east. Some also support shrub or grass vegetation, and in addition to being used as forest, some have been cleared and are used as cropland or pasture.	Channery loam, channery silt loam, fine sandy loam, gravelly coarse sandy loam, gravelly fine sandy loam, gravelly loam, gravelly sandy loam, gravelly silt loam, loam, loamy sand, sand, sandy loam, silt loam, stratified sand and gravel, stratified very gravelly coarse sand to gravelly loamy fine sand, unweathered bedrock, very channery fine sandy loam, very channery loam, very channery silt loam, very gravelly fine sandy loam, very gravelly loam	0-60	Moderately well drained to somewhat excessively drained	No	A, B, C, D	Low, Medium, High	High, Moderate, Low, Very Low	Low to High, depending on slope	Low
Ultisols	Udults	Udults are more or less freely drained, relatively humus poor, and have a udic moisture regime. Most of these soils currently support or formerly supported mixed forest vegetation, and many have been cleared and used as cropland (mostly with the use of soil amendments).	Silt loam, stratified gravelly loamy sand	0-25	Moderately well drained	No	B, C	Medium	Moderate, Low	Medium, depending on slope	Low

Source: (NRCS, 2015d) (NRCS, 1999)

11.1.3 Geology

11.1.3.1 Definition of the Resource

The U.S. Geological Survey (USGS) is the primary government organization responsible for the nation's geological resources. USGS defines geology as an interdisciplinary science with a focus on the following aspects of earth sciences: geologic hazards and disasters, climate variability and change, energy and mineral resources, ecosystem and human health, and ground-water availability. Several of these elements are discussed in other sections of this PEIS, including Water Resources (Section 11.1.4), Human Health and Safety (Section 11.1.15), and Climate Change (Section 11.1.14).

This section covers the six aspects of geology most relevant to the Proposed Action and Alternatives:

- Section 11.1.3.3, Major Physiographic Regions[31]and Provinces[32]
- Section 11.1.3.4, Surface Geology
- Section 11.1.3.5, Bedrock Geology[33]
- Section 11.1.3.6, Paleontological Resources[34]
- Section 11.1.3.7, Fossil Fuel and Mineral Resources
- Section 11.1.3.8, Potential Geologic Hazards[35]

11.1.3.2 Specific Regulatory Considerations

The Proposed Action must meet the requirements of NEPA and other applicable laws and regulations. Applicable federal laws and regulations that apply to Geology, such as the National Historic Preservation Act and the Clean Water Act, are detailed in Section 11.1.4.5. A list of applicable state laws and regulations is included in Table 11.1.3-1 below.

Table 11.1.3-1: Relevant New York Geology Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
New York Education: Part 1 Section 233 State Museum; collections made by the staff	New York State Education Department	Require that no person appropriates, excavates, injures, or destroys any object of archaeological and paleontological interest on state lands without prior approval by the appropriate agency. Applications are required for paleontological research on state lands.
2014 New York City (NYC) Construction Codes	City of New York	Provide design guidelines to help minimize the probability of a new structure collapsing

[31] Physiographic regions: Areas of the United States that share commonalities based on topography, geography, and geology. (Fenneman, 1916)
[32] Physiographic provinces: Subsets within physiographic regions. (Fenneman, 1916).
[33] Bedrock: Solid rock beneath the soil and superficial rock. (USGS, 2015a)
[34] Paleontology: "Study of life in past geologic time based on fossil plants and animals." (USGS, 2015b)
[35] Geologic Hazards: Any geological or hydrological process that poses a threat to people and/or their property, which includes but is not limited to volcanic eruptions, earthquakes, landslides, sinkholes, mudflows, flooding, and shoreline movements. (NPS, 2013)

State Law/Regulation	Regulatory Agency	Applicability
		or sustaining significant damage during an earthquake.
Seismic Criteria Guidelines (1998)	New York City Department of Transportation (NYCDOT)	Seismic guidelines must be followed during NYCDOT projects.
American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications, Fifth Edition, together with the 2010 Interim Revisions and the "NYSDOT LRFD Blue Pages" (2011)	NYSDOT	LRFD Bridge Design Specifications to be followed during NYSDOT projects.

11.1.3.3 Environmental Setting: Physiographic Regions and Provinces

The concept of physiographic regions was created in 1916 by geologist Nevin Fenneman as a way to describe areas of the United States based on common landforms (i.e., not climate or vegetation). Physiographic regions are areas of distinctive topography, geography, and geology. Important physiographic differences between adjacent areas are generally due to differences in the nature or structure of the underlying rocks. There are eight distinct physiographic regions in the continental United States: 1) Atlantic Plain, 2) Appalachian Highlands, 3) Interior Plains, 4) Interior Highlands, 5) Laurentian Upland, 6) Rocky Mountain System, 7) Intermontane Plateaus, and 8) Pacific Mountain System. Regions are further sub-divided into physiographic provinces based on differences observed on a more local scale (Fenneman, 1916).

New York has three major physiographic regions: Atlantic Plain, Appalachian Highlands, and Interior Plains (USGS, 2003a). The locations of these regions are shown in Figure 11.1.3-1 and their general characteristics summarized in the following subsections.

Atlantic Plain Region

The Atlantic Plain Region includes the Continental Shelf and the Gulf and Atlantic Coast plains stretching from New York to Texas. The Atlantic Plain Region formed through the repetitive rise and fall of the oceans over the last 150 million years. Sedimentary strata become thinner moving westward through the region, and thicken to several thousand feet thick along the coastline. Erosion from the nearby Appalachian Mountains, which began to form 480 to 440 million years ago (MYA), dislodged sediments, which were subsequently deposited by rivers to form the Atlantic Plain. The area is characterized by gentle topography and a transition zone between the land and sea often having marshes, lagoons, swamps, sand bars, and reefs. Deposits of coastal marine life over millions of years form the basis for rich fossil fuel reserves in the region (NPS, 2015a).

Within New York, the extent of the Atlantic Plain (referred to locally as the New York Bight) is limited to southern Staten Island, northwestern Brooklyn, and Long Island. The entirety of New York's Atlantic Plain landscape is contained within the Coastal Plain Province. New York's

Coastal Plain represents the terminal moraines[36] of a glacier and the associated outwash aprons.[37] The region is relatively flat compared to the adjacent Appalachian Highlands, ranging from sea level to approximately 400 feet above sea level (NYSDOT, 2013).

Appalachian Highlands Region

The Appalachian Highlands Region extends from Canada to Alabama. This region is composed of layers of folded sedimentary rock[38] created when the North American plate collided with Eurasian and African plates more than 500 million years ago (MYA). Once similar in height to the present-day Rocky Mountains,[39] the Appalachian Highlands have eroded considerably, and most peaks are now under 5,000 feet above sea level (ASL). The current Appalachian Highlands Region is characterized by prime and unique farmlands and is rich in mineral resources (USGS, 2003a).

As reported above, the Appalachian Highlands Region within New York is composed of several physiographic provinces, most notably the Adirondack Mountains, Appalachian Plateaus, and St. Lawrence Valley (USGS, 2003a).[40]

[36] Moraine: "A general term for unstratified and unsorted deposits of sediment that form through the direct action of, or contact with, glacier ice." (USGS, 2013c)
[37] Outwash apron: "A broad, low-slope angle alluvial plain composed of glacially eroded, sorted sediment (termed outwash), that has been transported by meltwater. The alluvial plain begins at the foot of a glacier and may extend for miles." (USGS, 2013c)
[38] Sedimentary Rock: "Rocks that formed from pre-existing rocks or pieces of once-living organisms. They form from deposits that accumulate on the Earth's surface. Sedimentary rocks often have distinctive layering or bedding." (USGS, 2014a)
[39] The Rocky Mountains exceed 14,000 feet above sea level. (NPS, 2016)
[40] Note that the analysis covers only the dominant physiographic provinces in the state.

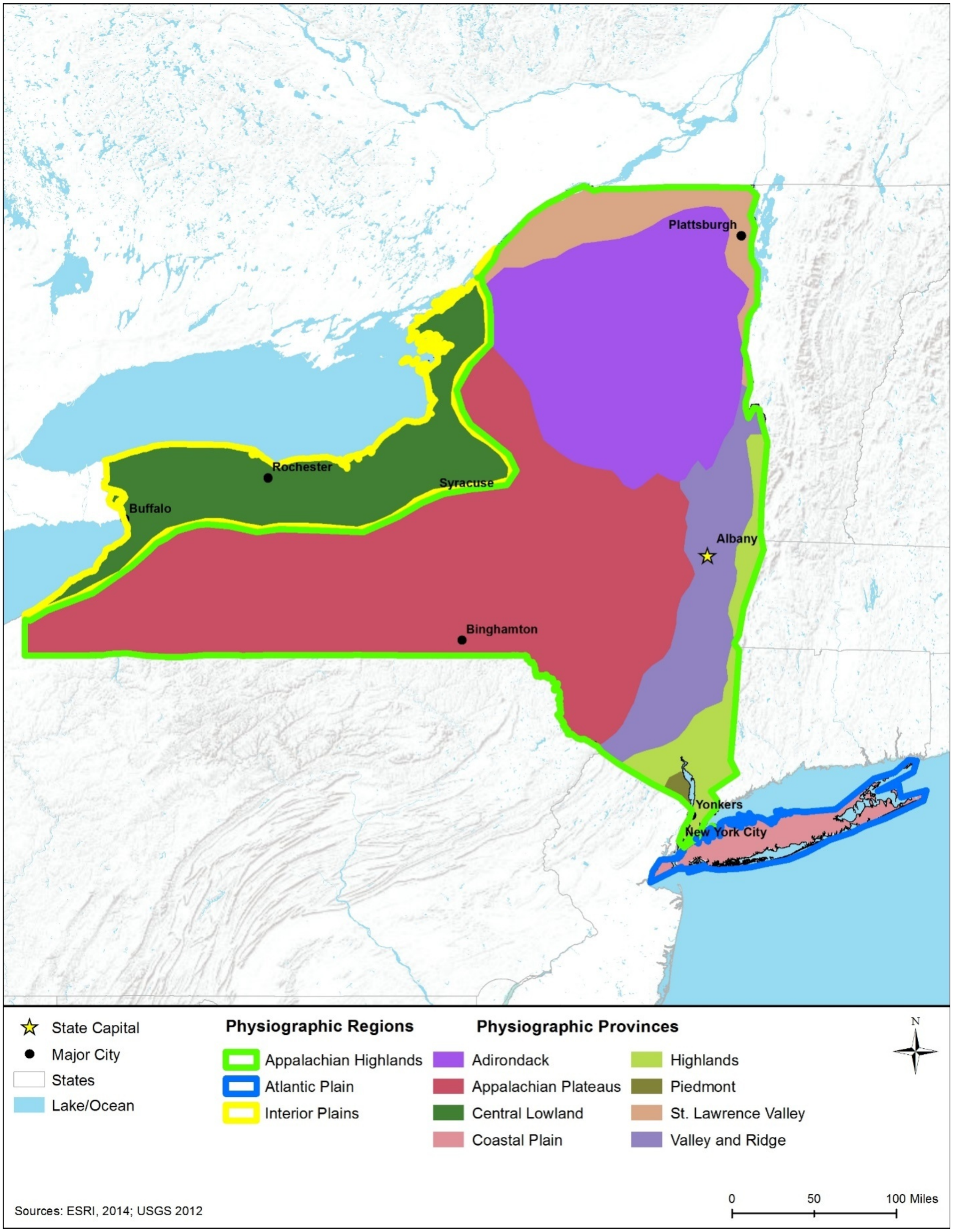


Figure 11.1.3-1: Physiographic Regions and Provinces of New York

Adirondack Province – The Adirondack Province covers approximately 17,000 square miles (i.e., about one-fourth of the state) in the northern portion of New York. The province is bounded by large intrusions of igneous rock[41] into existing sedimentary rocks. The Adirondack Province can be sub-grouped into the Mountain Peaks, Low Mountains, and Western Hills. The Mountain Peaks sub-region includes the highest mountain peaks, topping out at over 5,000 feet above sea level (ASL); Mount Marcy is the highest peak in this area with an elevation of 5,344 feet ASL. The Low Mountains surround the Mountain Peaks, and are an area of slightly lower relief with some summit elevations more than 2,000 feet ASL. The Low Mountains includes numerous glacial lakes, such as Upper and Lower Saranac Lakes, Tupper Lake, Requite Lake, and the Fulton Chain of Lakes. The Western Hills include an area in the western Adirondacks with the lowest degree of topographic relief in the province. The Western Hills are considered to be the "foothills" to the Province's mountains (NYSDOT, 2013).

Appalachian Plateaus Province – The Appalachian Plateaus Province is the largest physiographic province in New York, comprising about one-third of the state. The northern portion of the Province contains limestone and the southwest corner is characterized by small patches of conglomerate.[42] The remainder of the Appalachian Plateaus Province is underlain by thick shales,[43] siltstones,[44] and other weak sedimentary rocks. One prominent feature in the eastern portion of the province is the Heidelberg escarpment[45] which separates the Appalachian Plateaus Province from the Hudson Mohawk lowlands. Sedimentary rocks that lie nearly horizontal underlie the Appalachian Plateau. Water and ice erosion have created relief varying in elevation from 500 to 600 feet in the north to more than 2,000 feet in the south. Within the Appalachian Plateaus, the Catskill section rises considerably higher than the neighboring areas to elevations exceeding more than 4,000 feet in some locations (NYSDOT, 2013).

St. Lawrence Valley Province – The St. Lawrence Valley Province is a plain that borders the Adirondack Mountains and extends north into Canada. The Valley's eastern boundary is defined by the drainage divide where water begins to flow to Lake Champlain. Most of the province lies as a flat to rolling lake plain that has been smoothed by proglacial[46] lake or marine waters. Most elevations within the province are below 75 feet. The entire province is underlain by sedimentary rocks, including dolostone,[47] limestone,[48] and sandstone[49] (NYSDOT, 2013).

[41] Igneous Rock: "Rock that forms when hot, molten rock (magma) crystallizes and solidifies." (USGS, 2014b)
[42] Conglomerate: "A course-grained sedimentary rock composed of rounded fragments of pebbles, cobbles, or boulders cemented into a solid mass." (Carter, Driscoll, & Williamson, 2005)
[43] Shale: "A fine-grained sedimentary rock, characterized by its grain size (< 1/256 mm) and fissility. It contains clay minerals and fine grains of quartz and feldspars, plus organic material, but the classification of “shale” still rests on particle size rather than mineralogy." (USGS, 2013d)
[44] Siltstone: "A massive mudstone in which silt-sized particles predominate over clay-sized particles.” (USGS, 2014c)
[45] Escarpment: "A cliff formed by faulting, erosion, or landslides." (USGS, 2014d)
[46] Proglacial: "environments are defined as those which are located close to the ice front of a glacier, ice cap or ice sheet." (Slaymaker, 2011)
[47] Dolostone: "A sedimentary rock composed primarily of calcium-magnesium carbonate." (Carter, Driscoll, & Williamson, 2005)
[48] Limestone: "A sedimentary rock consisting mostly of calcium carbonate, primarily in the form of the mineral calcite." (Carter, Driscoll, & Williamson, 2005)
[49] Sandstone: "A sedimentary rock composed of abundant rounded or angular fragments of sand set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material." (Carter, Driscoll, & Williamson, 2005)

Interior Plains Region

The Interior Plains Region stretches between western New York and eastern Montana, and south to Texas. The region includes the U.S. Great Plains, formed from the erosion of the Rocky Mountains during the Cenozoic Era (i.e., within the last 65 million years), is underlain by sedimentary rock. This region has relatively low topographic relief, compared to the adjacent Appalachian Highlands (USGS, 2003a).

Within New York, the Interior Plains Region is sub-classified as the Central Lowland Province, and is confined to areas in western portions of the state along the Great Lakes (Figure 11.1.3-1). The Interior Plains border the Appalachian Plateaus to the south, Lake Erie and Lake Ontario to the west and north, respectively, and portions of the Adirondack Province to the east. The lowlands are flat, except for the Niagara escarpment and the groups of drumlins[50] south of Lake Ontario (NYSDOT, 2013).

11.1.3.4 Surface Geology

Surficial geology is characterized by materials such as till,[51] sand and gravel, or clays that overlie bedrock. The surface terrain, which can include bedrock outcrops, provides information on the rock compositions and structural characteristics of the underlying geology. Because surface materials are exposed, they are subject to physical and chemical changes due to weathering from precipitation (rain and snow), wind and other weather events, and human-caused interference. Depending on the structural characteristics and chemical compositions of the surface materials, heavy precipitation can cause slope failures,[52] subsidence,[53] and erosion (Thompson, 2015).

Most of the surficial materials in New York are from deposits that formed between 25,000 and 12,000 years ago during the last stage of continental glaciation.[54] During this cycle, glaciers formed across the northern hemisphere and when those glaciers receded, surficial materials such as glacial till, lake sediments (formed by glaciers), and other marine/glacial sediments were deposited. The Harbor Hill Moraine on Long Island represents the terminal moraine of the most recent (about 18,000 years ago) advance of a Wisconsin Stage glacier. Terminal moraine deposits also occur across northern Staten Island. Figure 11.1.3-2 depicts the main surficial composition of New York (Stoffer, P.; Messina, P., 1996).

[50] Drumlins: "An elongated ridge of glacial sediment sculpted by ice moving over the bed of a glacier." (USGS, 2013a)
[51] Till: "An unsorted and unstratified accumulation of glacial sediment, deposited directly by glacier ice. Till is a heterogeneous mixture of different sized material deposited by moving ice (lodgement till) or by the melting in-place of stagnant ice (ablation till). After deposition, some tills are reworked by water." (USGS, 2013e)
[52] Slope failure, also referred to as mass wasting, is the downslope movement of rock debris and soil in response to gravitational stresses.
[53] Subsidence: "Gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials." (USGS, 2000)
[54] Glaciation is the process or time marked by glacial coverage or sheets of ice from colder temperatures.

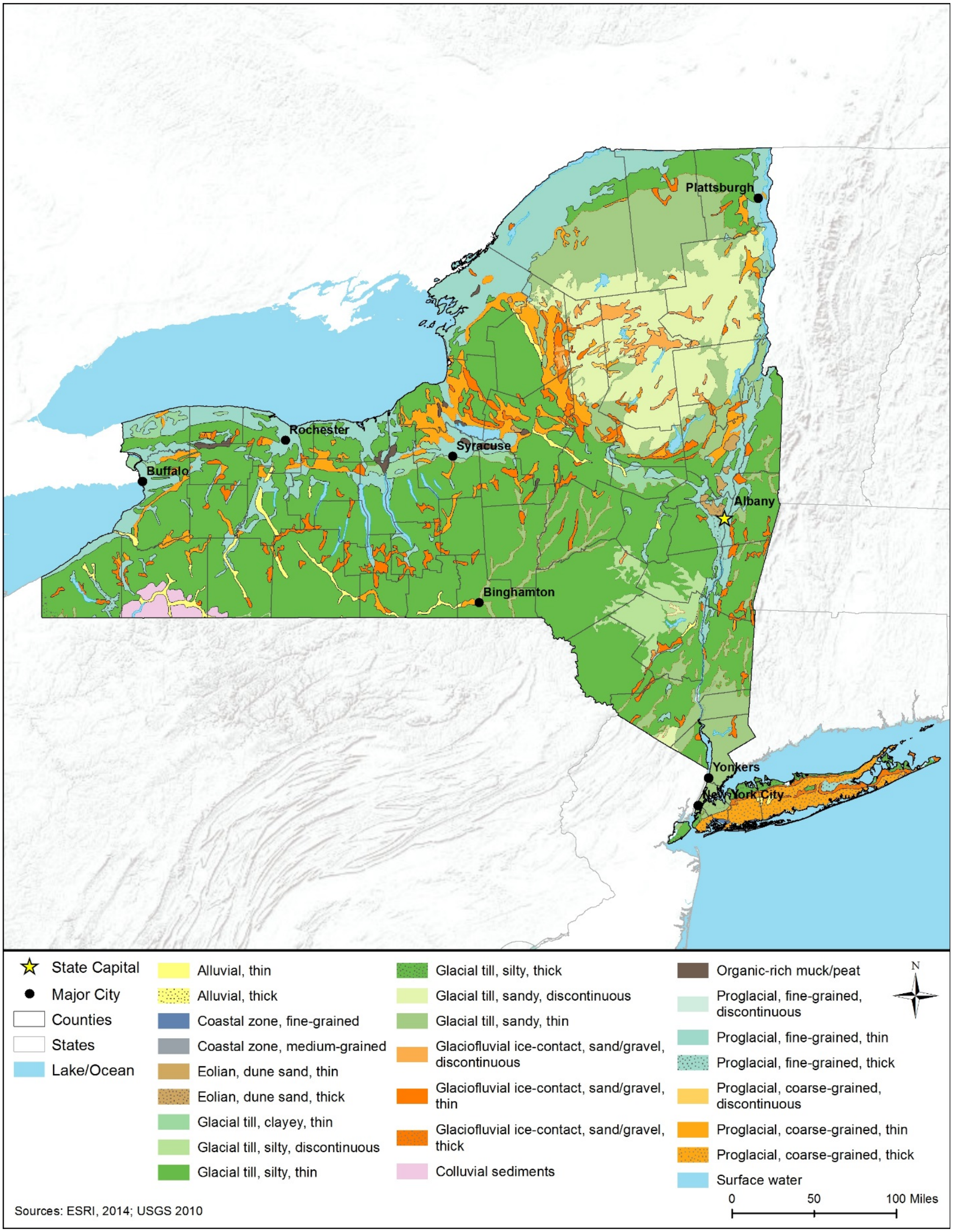


Figure 11.1.3-2: Generalized Surface Geology for New York

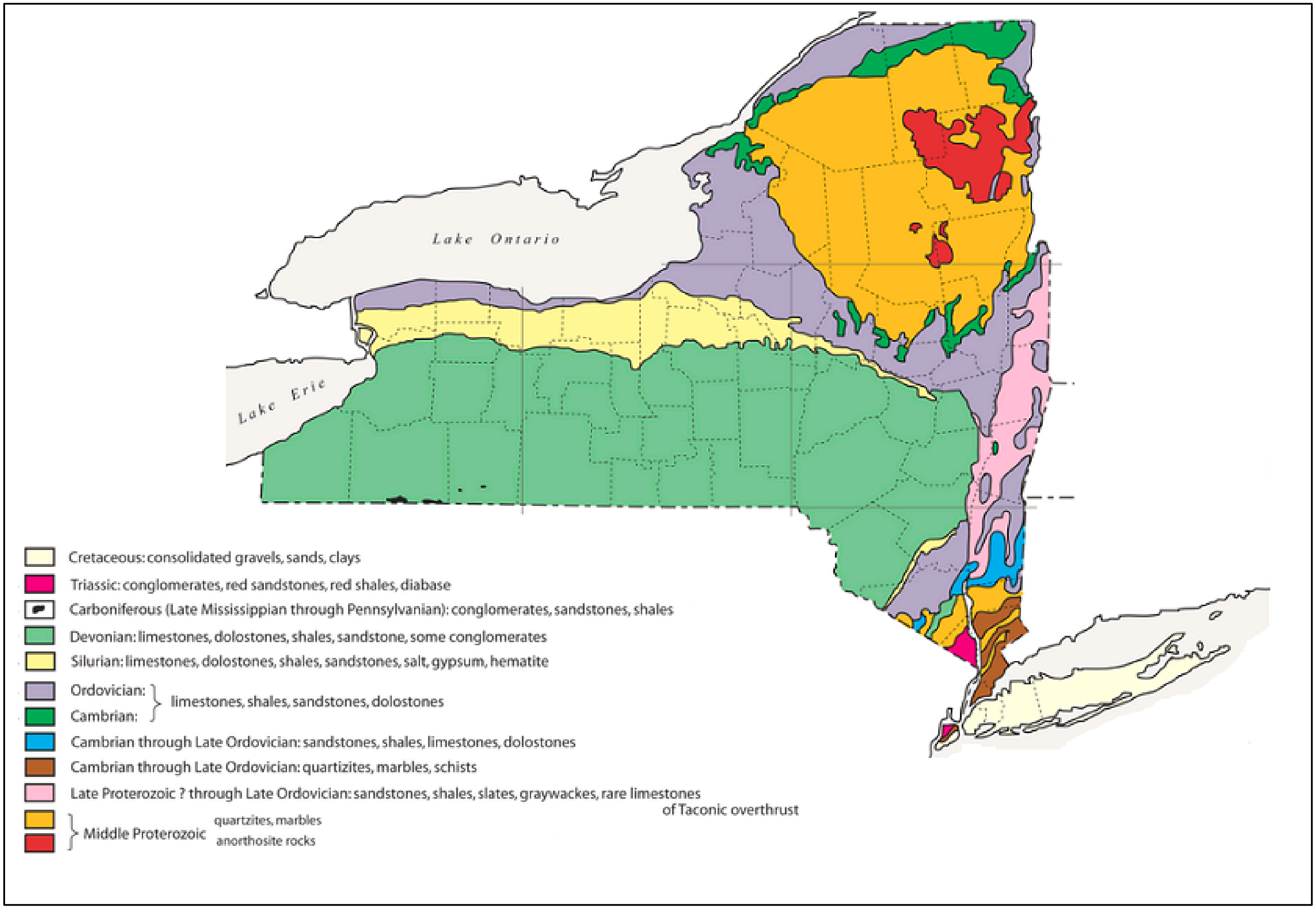
11.1.3.5 Bedrock Geology

Bedrock geology analysis, and "the study of distribution, position, shape, and internal structure of rocks" (USGS, 2015c) reveals important information about a region's surface and subsurface characteristics (i.e., 3-dimensional geometry), including dip (slope of the formation),[55] rock composition, and regional tectonism.[56] These structural aspects of bedrock geology are often indicative of regional stability, as it relates to geologic hazards such as landslides, subsidence, earthquakes, and erosion (New Hampshire Department of Environmental Services, 2014).

Some physiographic regions and provinces in New York have bedrock that dips steeply, increasing the vulnerability of infrastructure to landslides. Provinces with more gentle bedrock dip include the Appalachian Plateaus and the St. Lawrence Valley. The Appalachian Plateaus' bedrock dips mainly to the southwest at a low angle. The St. Lawrence Valley Province's bedrock is layered and gently dips northward away from the Adirondack Province. This mostly flat lying geomorphology suggests stability in this region as well, reducing the chances of geologic hazards caused by gravity or landscape movement (NYSDOT, 2013).

Despite no active tectonic plate[57] boundaries in New York, there are existing vulnerabilities around fault lines (see Section 11.1.3.8, Geologic Hazards). Figure 11.1.3-3 shows the general bedrock geology for New York.

[55] Dip: "A measure of the angle between the flat horizon and the slope of a sedimentary layer, fault plane, metamorphic foliation, or other geologic structure." (NPS, 2000)
[56] Tectonism: "Structure forces affecting the deformation, uplift, and movement of the earth's crust." (USGS, 2016a)
[57] Tectonic Plate: A massive, irregularly shaped slab of solid rock generally composed of both continental and oceanic rock material. (USGS, 1999a)



Source: (New York State Geological Survey, 2015a)

Figure 11.1.3-3: Generalized Bedrock Geology for New York

11.1.3.6 Paleontological Resources

New York State Fossil - *Eurypterus Remipes Dalmanites limulurus*

Source: (New York State Library, 2009)

New York has an abundance of fossils, particularly those of organisms that lived in shallow seas that covered much of the state during the Paleozoic Era (approximately 542 to 251 MYA). Many of the rocks laid down during the Ordovician (488 to 444 MYA), Silurian (444 to 416 MYA), and Devonian (416 to 359 MYA) periods include beds of well-preserved remains representing diverse brachiopods, mollusks, bryozoans, corals, trilobites, and crinoids.[58] Additionally, two western New York localities lend their names to major divisions of geologic time used in North America: the Niagaran is the middle part of the Silurian Period, and the Erian, for exposures along the Lake Erie shore, is the middle part of the Devonian Period New York's fossils are most commonly found in sedimentary rocks (Rochester Academy of Science, 2015).

Potential Fossil-Bearing Geology

During the late Cambrian (542 to 488 MYA) and Ordovician periods, sea level rose and covered the state with a shallow sea. Exposures in patchy areas near the Adirondack Dome in northeastern New York reveal Cambrian Period sedimentary rocks, while Ordovician Period rocks have been located across the state. Fossils from these exposures include trilobites, brachiopods, clams, and other marine organisms. Sea level dropped during the Silurian Period in western New York, resulting in the formation of salt deposits as evaporation occurred. These Silurian period rocks exposed between Lake Ontario and the Finger Lakes region contain marine fossils. Additionally, Devonian-age sedimentary rocks are exposed in central and southern New York. During this time, mountains formed by the Acadian Orogeny eroded rapidly and provided huge amounts of sediments to rivers and streams. This sediment was deposited on the Catskill Delta and into the inland ocean to the west, with plant fossils indicating that some of the earliest forests flourished on these delta sediments (Paleontology Portal, 2015).

New York Fossils

According to the New York State Geological Survey (NYSGS) (New York State Geological Survey, 2015b), most fossils in the state are found in sedimentary rocks, including sandstone, shale, mudstone, siltstone, limestone, and dolostone. Sedimentary rocks are formed by the deposition of distinct particles or sediments in layers, and the sediments then transformed into rock by compaction or cementing the grains together (Rochester Academy of Science, 2015). The major fossil groups (invertebrate animals) commonly represented in New York include: porifera (sponges); cnidarian (corals, hydroids, and jellyfish); bryozoan; brachiopoda; pelecypoda (clams, mussels, oysters); gastropoda (snails); cephalopoda (nautilus, ammonoids,

[58] These organisms are examples of animals that have formed fossils through the process of mineralization, where calcium carbonate, calcium phosphate, or silica are deposited within the organism's skeletal remains.

squid, and octopus); trilobita; eurypterida; crinoidea; and graptolites (Rochester Academy of Science, 2015).

11.1.3.7 Fossil Fuel and Mineral Resources

Oil and Gas

New York has been a major natural gas and crude oil producer since the early 20th century. Natural gas production reached its peak of 55.98 million cubic feet (mcf) in 2006. New York's current gas production represents a nearly three-fold increase since the mid-1990s. As of 2013, New York had 23,458 natural gas producing wells in operation (EIA, 2015i).

New York's first commercial oil well was drilled in Cattaraugus County in 1865 and oil production in the state peaked at more than 6.5 million barrels of oil in 1882 (NYSDEC, 2007a). At that time, New York was one of the top oil-producing states in the nation. Since that time, New York has continued to produce oil from several fields in the southwestern part of the state. Total production for 2014 was 341,000 barrels (EIA, 2015j). Oil and gas in New York is primarily drilled from Paleozoic (542 to 251 MYA) sedimentary rocks in the Appalachian Basin, which includes an area that stretches from Nova Scotia to Alabama (Selleck, 2015). Figure 11.1.3-4 depicts New York's oil and gas production areas. New York's oil and gas wells are primarily in the western portion of the state, with a few in Otsego County.

The largest shale play[59] in is the region is the Marcellus Shale Formation (Figure 11.1.3-5) which stretches across nine states[60] and has been estimated to contain up to 410 trillion cubic feet of natural gas. However like many other large shale plays, only a portion of the formation has been put into production, primarily in Pennsylvania and West Virginia, so the actual amount of natural gas it contains is unknown (Considine, Watson, Sparks, & Entler, 2009).

[59] "A set of discovered, undiscovered, or possible natural gas accumulations that exhibit similar geological characteristics. Shale plays are located within basins, which are large-scale geologic depressions, often hundreds of miles across, which also may contain other oil and natural gas resources. For a map detailing the location of major shale gas plays in the lower 48 states, see: http://www.eia.gov/oil_gas/rpd/shale_gas.pdf." (DOE, 2013)

[60] The Marcellus Shale Formation is found in portions of New York, New Jersey, Pennsylvania, Maryland, Virginia, Ohio, West Virginia, Kentucky, and Tennessee. (NRCS, 2015d).

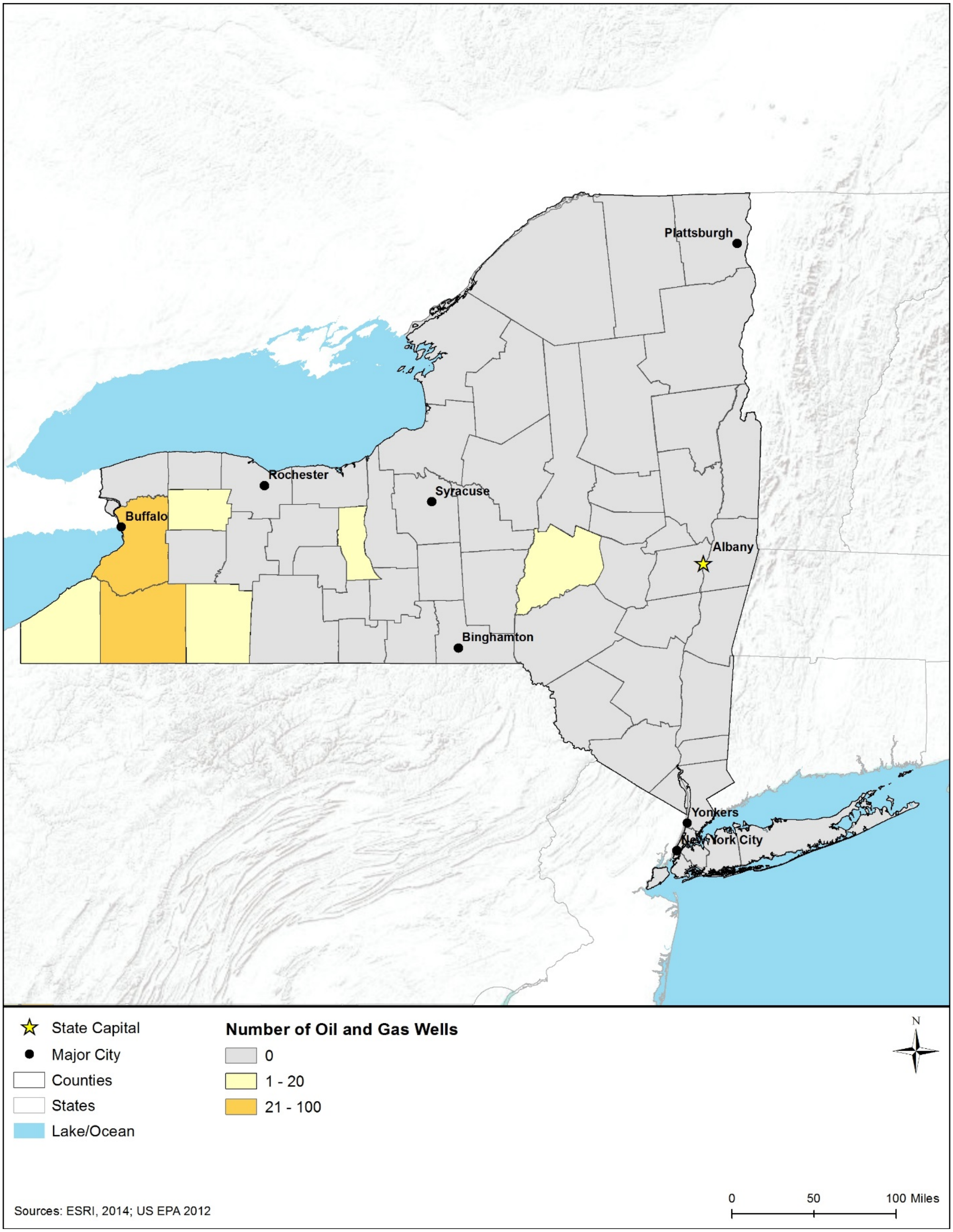


Figure 11.1.3-4: New York Oil and Gas Fields

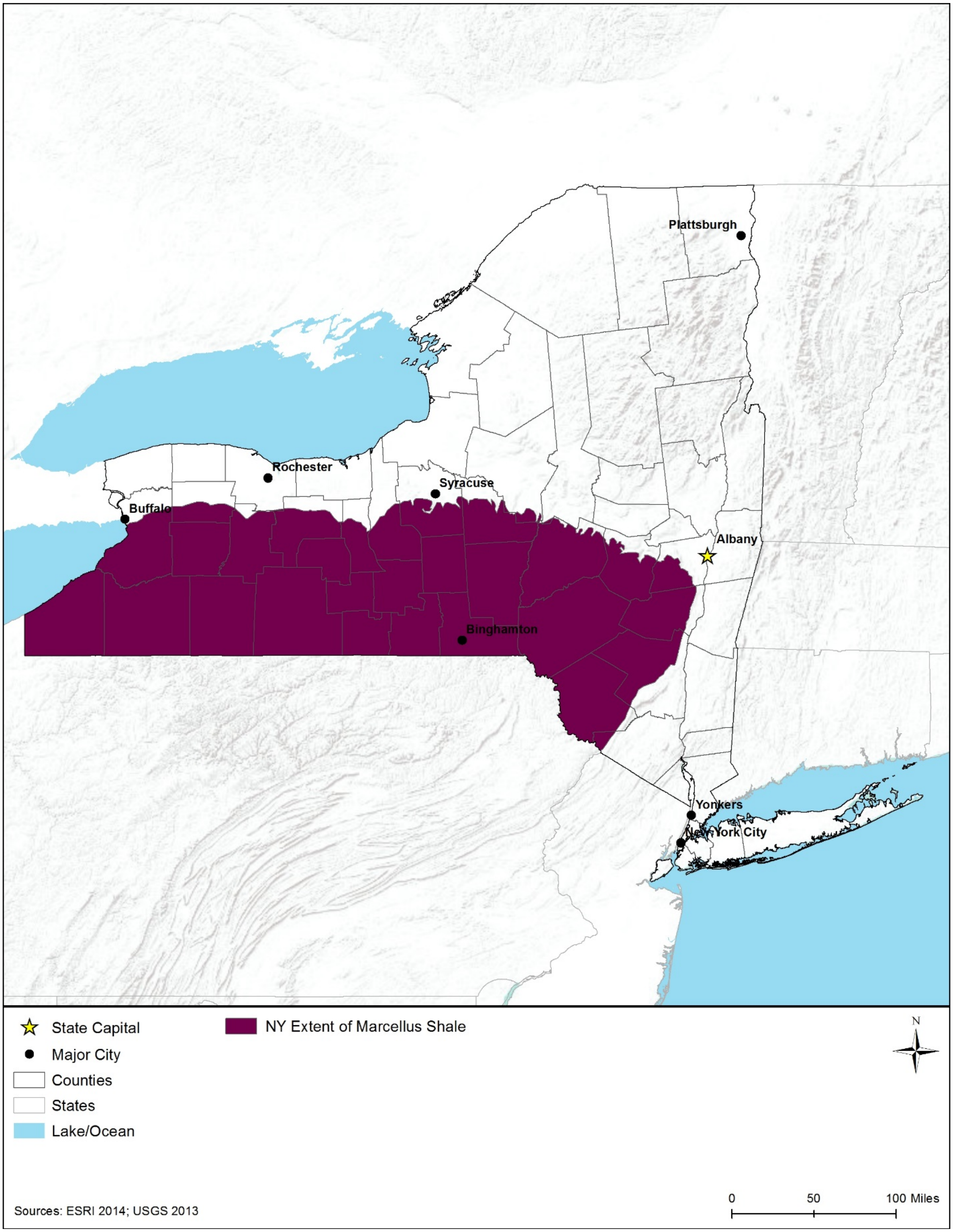


Figure 11.1.3-5: Extent of Marcellus Shale Formation in New York

Minerals

Primary mineral resources in New York are clay, garnet, peat, salt, slate, talc, wollastonite, and previously, zinc, lead, and silver (now inactive mines). Sand and gravel mines are New York's most common type of mine with 1,578 active mines spread across the state (NYSDEC, 2015bl). "Suffolk, Dutchess, and Rensselaer counties are among the leading producers of sand and gravel due to high quality glacial deposits in those counties and their proximity to large populations that require these materials for roads, buildings, and other infrastructure (NYSDEC, 2013a). "Additionally, there are areas of the state that contain carbonate rocks and other areas underlain by gypsum; the southwest region of the state is underlain by salt (NYSDEC, 2013a). New York also produces shale, dimension stone,[61] gemstones, and gypsum (USGS, 2003b) (NYSDEC, 2012a).

In 2015, salt was New York's leading non-fuel mineral, followed by crushed stone and construction sand and gravel (in total dollars). These three commodities accounted for more than 80 percent of the state's non-fuel mineral value. The total value of New York's non-fuel raw mineral production was estimated at $1.53B for 2015. As of 2009, New York ranked 19th nationwide in in total non-fuel mineral production value, accounting for 2.3 percent of the U.S. total value. (USGS, 2016b) A 2011 report by the Center for Governmental Research and the NYSGS estimated the total economic impact of mining in New York at $4.9B (NYSDEC, 2013a).

11.1.3.8 Geologic Hazards

The three major geologic hazards of concern in New York are earthquakes, landslides, and subsidence. Volcanoes were considered but not analyzed further for New York because they do not occur in New York and therefore do not present a hazard to the state (USGS, 2015d). A discussion of each geologic hazard is included below.

Earthquakes

Areas of greatest seismicity in New York are concentrated in the northeast portions of the state. Between 1973 and March 2012, there were 14 earthquakes of a magnitude 3.5 (on the Richter scale) or greater in New York (USGS, 2014e). Earthquakes are the result of large masses of rock moving against each other along fractures called faults. Earthquakes occur when landmasses on opposite sides of a fault suddenly slip past each other; the grinding motion of each landmass sends out shock waves. The vibrations travel through the Earth and, if they are strong enough, they can damage manmade structures on the surface. Earthquakes can produce secondary flooding impacts resulting from dam failure or from tsunamis (USGS, 2012a).

The shaking due to earthquakes can be significant many miles from its point of origin depending on the type of earthquake and the type of rock and soils beneath a given location. Crustal earthquakes, the most common, typically occur at depths of 6 to 12 miles; these earthquakes

[61] Dimension stone: "Natural rock material quarried for the purpose of obtaining blocks or slabs that meet specifications as to size (width, length, and thickness) and shape." (USGS, 2016a).

typically do not reach magnitudes higher than 6.0 on the Richter scale.[62] Subduction zone earthquakes occur where Earth's tectonic plates collide. "When tectonic plates collide, one plate slides (subducts) beneath the other, where it is reabsorbed into the mantle of the earth" (Oregon Department of Geology, 2015). Subduction zones are found off the coast of Washington, Oregon, and Alaska (USGS, 2014f). Convergence boundaries between two tectonic plates can result in earthquakes with magnitudes that exceed 8.0 on the Richter scale (Oregon Department of Geology, 2015). New York is located far from any convergence boundaries, but is located in the middle of a tectonic plate (Kafka, 2014).

Figure 11.1.3-6 depicts the seismic risk throughout New York. The map indicates levels of horizontal shaking (measured in Peak Ground Acceleration (PGA)) that have a 2 percent chance of being exceeded in a 50-year period. Units on the map are measured in terms of acceleration due to gravity (% g). Most pre-1965 buildings are likely to experience damage with exceedances of 10 %[63] g (USGS, 2010).

Spotlight: New York's Largest Earthquake

The largest earthquake ever recorded in New York was a magnitude 5.8 quake that occurred in 1944 in the city of Massena; the earthquake's impacts covered the area spanning Canada to Maryland, and westward to Indiana. Property damage in Massena approached $2M (USGS, 2014g).

[62] The Richter scale is a numerical scale for expressing the magnitude of an earthquake on the basis of seismograph oscillations. The more destructive earthquakes typically have magnitudes between about 5.5 and 8.9; the scale is logarithmic and a difference of one represents an approximate thirtyfold difference in magnitude. (USGS, 2014l)

[63] Post-1985 buildings (built to earthquake standards in California) have experienced only minor damage with shaking of 60% g. (USGS, 2010)

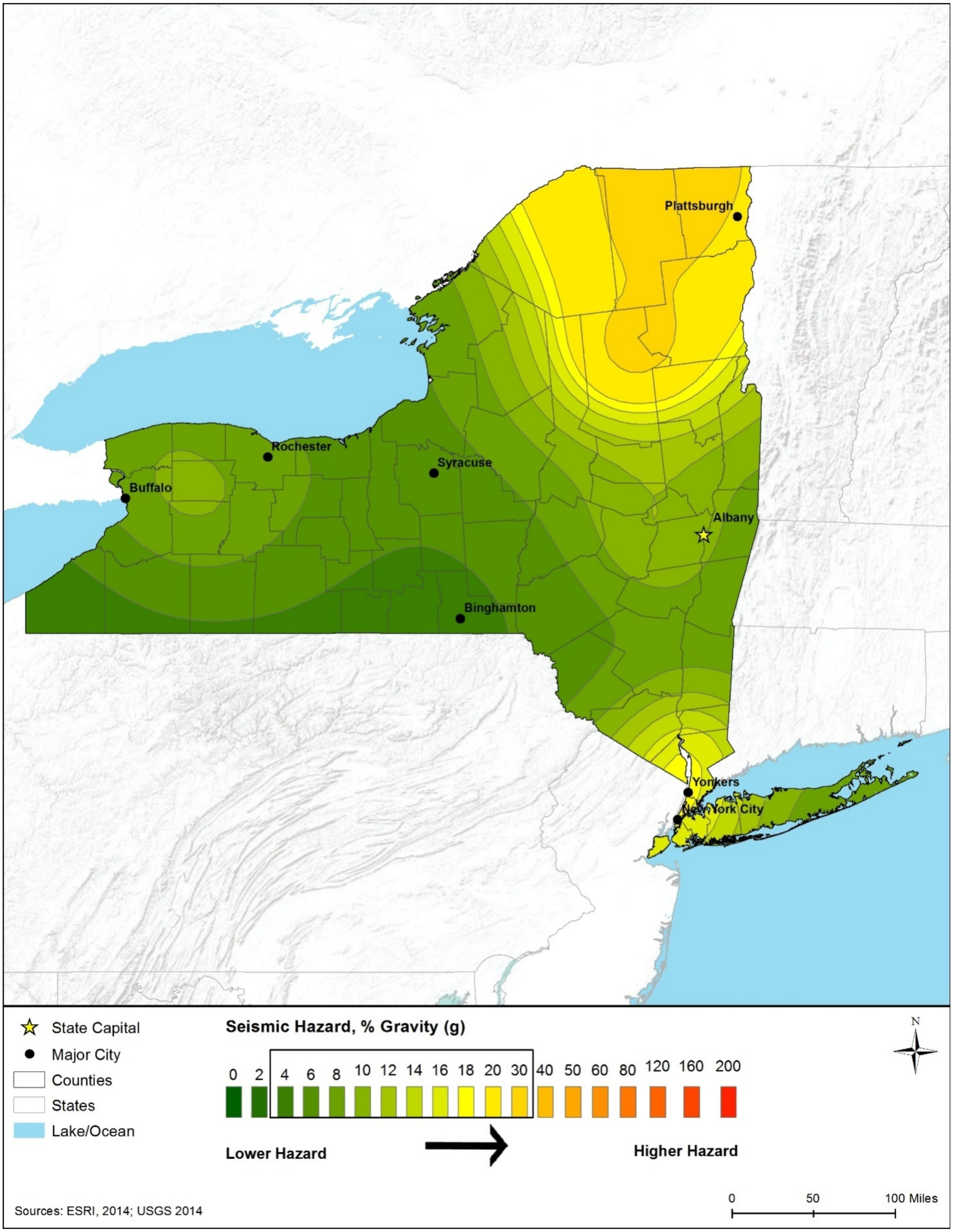


Figure 11.1.3-6: New York 2014 Seismic Hazard Map

The New York City metropolitan area is vulnerable to earthquake activity due to several fault lines running near the region, including the Ramapo Fault Line and the 125th Street Fault Line; the Ramapo fault runs 70 miles northeast from Morris County (NJ), through Ramsey and Suffern and the Hudson Highlands to Bear Mountain (NY). In New York City, the 125th Street fault begins just south of the George Washington Bridge on the Hudson River and heads through Harlem, then south across Central Park and the Upper East Side, across the East River, and under Queens (Groves, 2001).

New York (including surrounding areas in New Jersey) is an active earthquake zone that ranks fourth nationally behind Los Angeles, San Francisco, and Seattle in quake activity, though at a much lower degree of severity. There are several magnitude 2.0 to 2.9 earthquakes -- classified as "very minor" – in the area every month. One "minor" magnitude 3.0 to 3.9 quake occurs about once a year, and a "light" 4.0 to 4.9 quake happens once every four to 10 years (Groves, 2001).

Landslides

"The term 'landslide' describes many types of downhill earth movements, ranging from rapidly moving catastrophic rock avalanches and debris flows in mountainous regions to more slowly moving earth slides and other ground failures" (USGS, 2003c). Geologists use the term "mass movement" to describe a great variety of processes such as rock fall, creep, slump, mudflow, earth flow, debris flow, and debris avalanche regardless of the time scale (USGS, 2003c).

Landslides can be triggered by a single severe storm or earthquake, causing widespread damage in a short period. Most landslide events are triggered by water infiltration that decomposes and loosens rock and soil, lubricates frictional surfaces, adds weight to an incipient landslide, and imparts buoyancy to the individual particles. Intense rainfall, rapid snowmelt, freeze/thaw cycles, earthquakes, volcanic eruptions, and human alterations to the natural landscape can trigger mass land movements. Large landslides can dam rivers or streams, and cause both upstream and downstream flooding (USGS, 2003c).

According to the USGS and NYSGS, the highest potential for landslides in New York is found along major rivers and lake valleys that were formerly occupied by glacial lakes resulting in glacial lake deposits (glacial lake clays) and usually associated with steeper slopes, such as in the Hudson and Mohawk River Valleys. Figure 11.1.3-7 shows landslide incidence and susceptibility throughout New York (NYSDHSES, 2014a).

Most of New York soil consists of dense glacial till which is stable and resistant to sliding. The most landslide prone soils are those composed of glacial lake clay soils, at 10 degrees slope or higher. The greater the slope, the larger the potential landslide risk. Slope greater than 40 feet in height are most susceptible to landslides (NYSDHSES, 2014a).

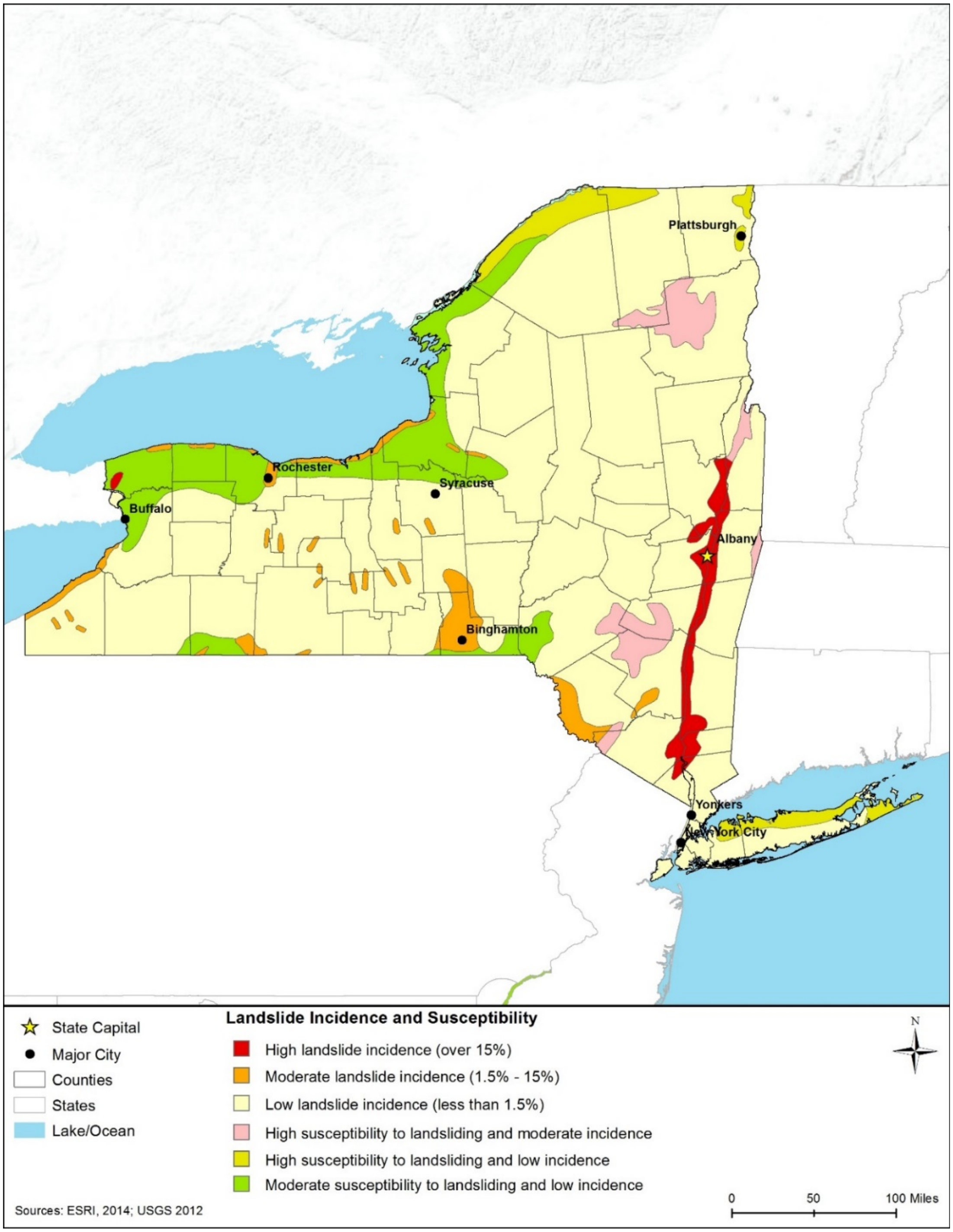


Figure 11.1.3-7: New York Landslide Incidence and Susceptibility Hazard Map[64]

[64] Susceptibility hazards not indicated in Figure 11.1.3-7 where same or lower than incidence. Susceptibility to landslides is defined as the probable degree of response of areal rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landslides. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated. (USGS, 2014i)

Between 1960 and 2012, 23 major landslide events were recorded in New York. Essex, Montgomery, and Herkimer counties have had the most events since 1960. Based on historical frequency, there have been no fatalities and only one reported injury (in Montgomery County). The state has had more than $1.8M in economic losses, the majority in property damage, with more than $1M of that damage coming in Montgomery County alone. Figure 11.1.3-8 shows landslide events by county in New York for the years 1960 to 2012 (New York State Geological Survey, 2015c).

Based on historical records from the NYSGS Landslide Inventory Study, the state can anticipate on average two major landslides annually, a larger number of smaller landslides each year, and at least one landslide causing a fatality is expected once every 12 years (NYSDHSES, 2014a).

Spotlight: New York's Largest Landslide

New York's largest recorded landslide occurred in May 2011 in the town of Keene, when more than 82 acres of terrain moved. Hillslope movements were recorded at 1 millimeter an hour. (New York State Geological Survey, 2015c)

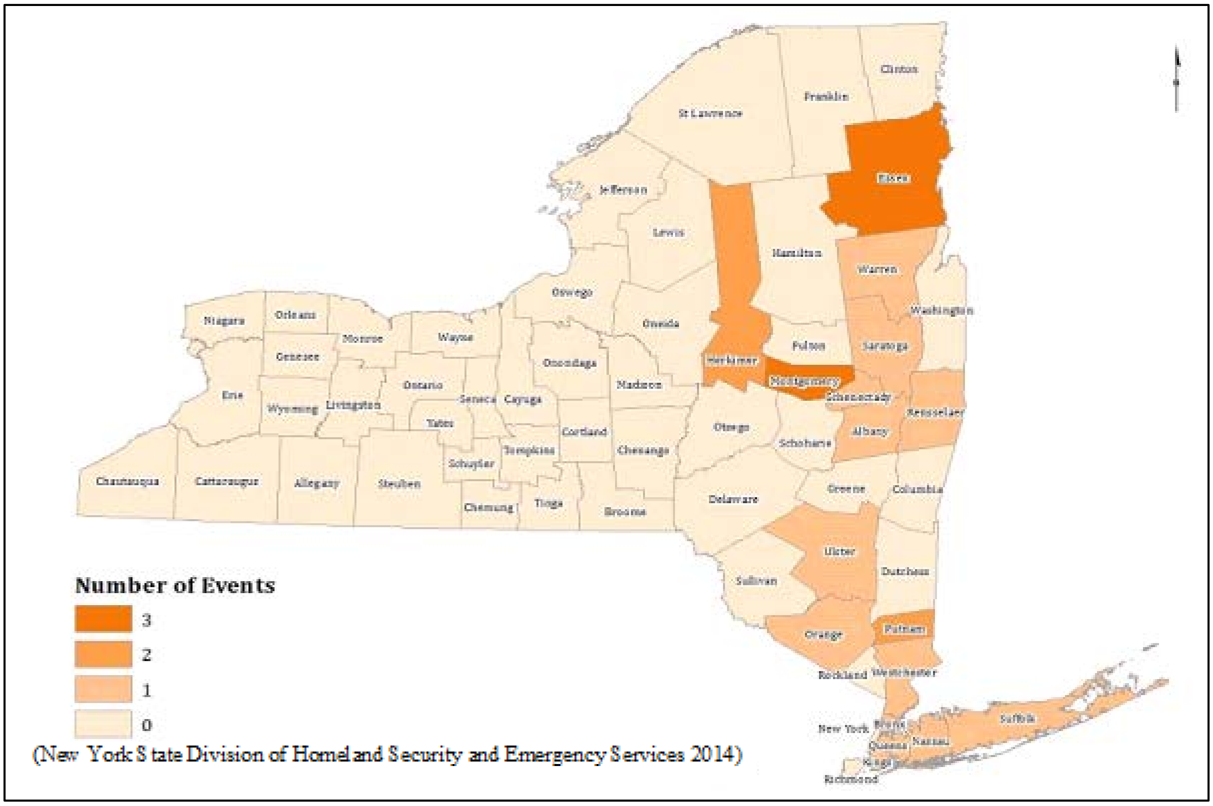


Figure 11.1.3-8: New York Landslide Events by County (1960 to 2012)

Subsidence

Land subsidence is a "gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials." The primary causes of land subsidence are attributed to aquifer system compaction, drainage of organic soils, underground mining, sinkholes, and thawing permafrost. More than 80 percent of subsidence in the United States is a consequence of over-withdrawal of groundwater. In many aquifers, which are subsurface soil layers through which groundwater moves, water is pumped from pore spaces between sand and gravel grains. If an aquifer is confined by layers of silt or clay, which do not transport groundwater, the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The reduced water pressure compromises support for the clay and silt beds, causing them to collapse on one another. The effects of this compression are seen in the lowering of the land surface elevation, which is permanent (USGS, 2000).

Land subsidence can result in altered stream elevations and slopes; detrimental effects to infrastructure and buildings; and collapse of wells due to compaction of aquifer sediments. Subsided areas can become more susceptible to inundation, both during storm events and non-events. Lowered terrain is more susceptible to inundation during high tides. Changes in ground-surface elevation not only affect the integrity and operation of existing infrastructure, but also complicate vegetation and best management of land use (USGS, 2013b).

In New York, a significant cause of land subsidence is the collapse of karst. "Karst is a distinctive topography in which the landscape is largely shaped by the dissolving action of water on soluble, carbonate bedrock (usually limestone, dolomite, or marble)" (NYSDHSES, 2008). Karst sinkholes are usually brought on by sinking soils resulting from cavities below the ground surface. Karst topography in New York follows the Helderberg Escarpment in Schoharie and Albany counties. According to the NYSGS, sinkholes have a tendency to occur due to manmade influences (e.g., mining), especially in areas with evaporite rocks (i.e., rocks that contain salt and gypsum). Sinkholes occur when underground voids collapse due to natural or human induced forces (NYSDHSES, 2008).

Figure 11.1.3-9 shows the location of areas in New York that are susceptible to land subsidence due to karst topography.

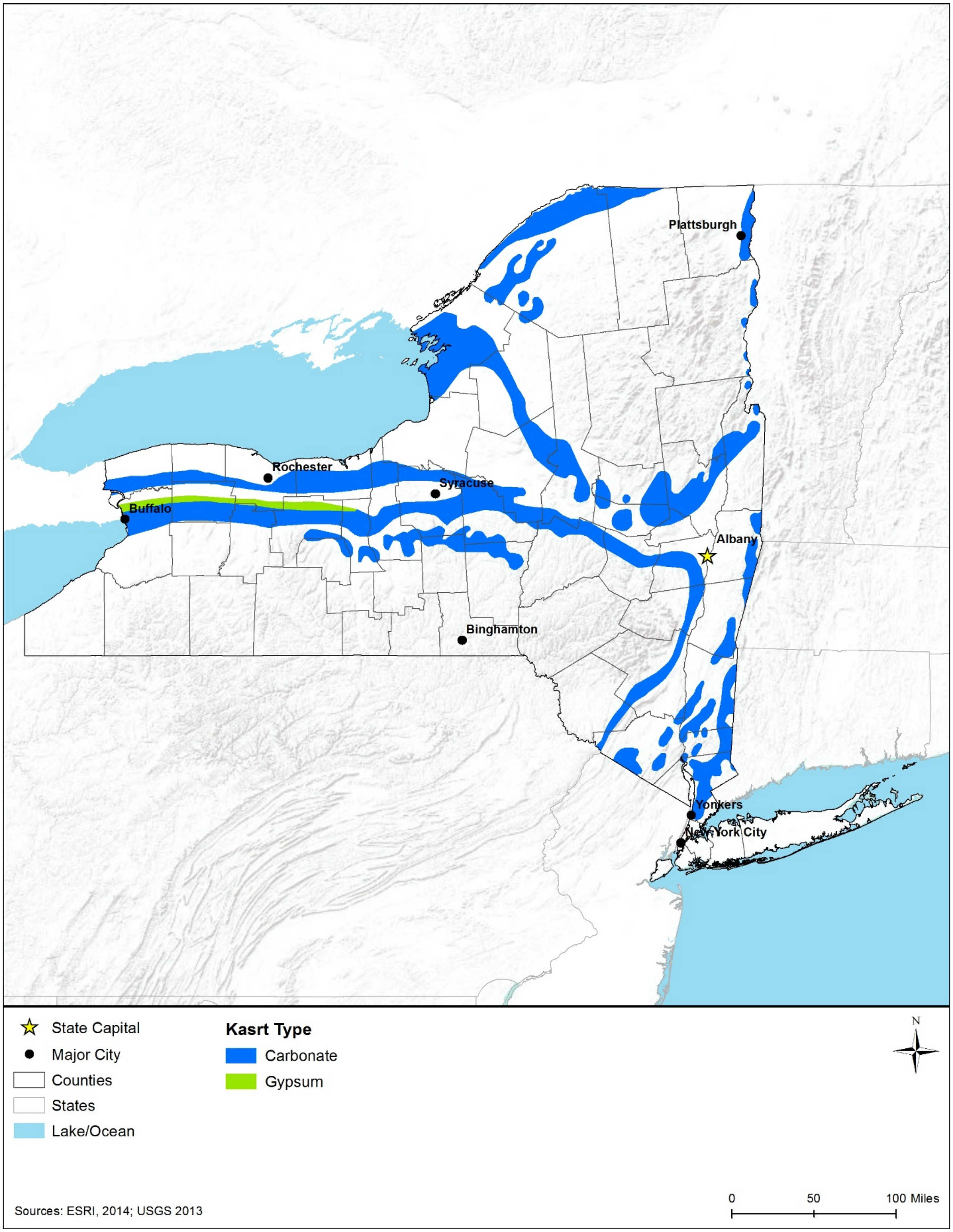
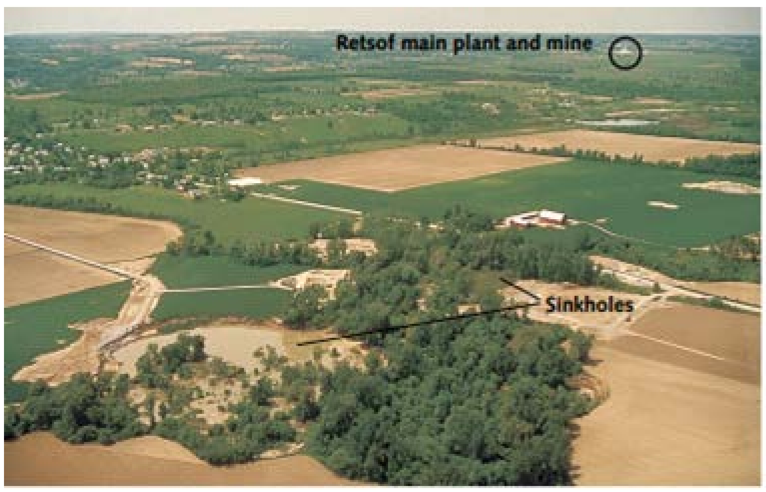


Figure 11.1.3-9: Areas Susceptible to Subsidence due to Karst Topography in New York

Spotlight on New York Subsidence: Retsof Salt Mine

One prominent example of land subsidence in New York is the March 1994 collapse of the Retsof Salt Mine (the largest salt mine in North America at the time), where a 250,000 square foot portion of the mine collapsed more than 1,000 feet below ground, in an area of the mine known as Room 2-Yard South. Scientists believe that the mine roof collapsed due to the infiltration of groundwater, which dissolved some of the salt that structurally supported the mine; the roof collapse led to "complete flooding of the mine, substantial declines in local groundwater levels, degradation of potable groundwater supplies, land subsidence, and release of methane and hydrogen sulfide gases to the atmosphere." Following collapse of the mine, a sinkhole developed at the land surface (Kappel, Yager, & Miller, 1994).

Photo of Sinkholes Resulting from the Retsof Salt Mine Collapse



Source: (Kappel, Yager, & Miller, 1994)

The sinkhole subsequently expanded to about 600 feet in diameter. Subsidence damage resulted in temporary loss of State Route 20A through Cuylerville, structural damage to homes and businesses, and damage to agricultural lands, public utilities, and cultural resources. Mining engineers expect the land overlying Retsof Mine to subside about 8 to 9 feet over the next 100 to 200 years. Additional subsidence in the area is anticipated due to aquifer compaction resulting from excessive groundwater withdrawals; groundwater level declines after the Retsof mine collapse measured more than 350 feet near the mine and as much as 50 feet as far as 8 miles away (Kappel, Yager, & Miller, 1994).

11.1.4 Water Resources

11.1.4.1 Definition of the Resource

Water resources are defined as all surface waterbodies and groundwater systems including streams, rivers, lakes, canals, ditches, estuarine waters, floodplains, aquifers, and other aquatic habitats (wetlands are discussed separately in Section 11.1.5). These resources can be grouped into watersheds, which are defined as areas of land whose flowing water resources (including runoff from rainfall) drain to a common outlet such as a river or ocean. The value and use of water resources are influenced by the quantity and quality of water available for use and the demand for available water. Water resources are used for drinking, irrigation, industry, recreation, and as habitat for wildlife. Some water resources that are particularly pristine, sensitive, or of great economic value enjoy special protections under federal and state laws. An adequate supply of water is essential for human health, economic wellbeing, and ecological health (USGS, 2014j).

11.1.4.2 Specific Regulatory Considerations

Federal laws relevant to protecting the quality and use of water resources are summarized in Appendix C, Environmental Laws and Regulations. Table 11.1.4-1 identifies the relevant laws and regulations for water resources in New York.

Table 11.1.4-1: Relevant New York Water Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Protection of Waters	New York State Department of Environmental Conservation (NYSDEC)	Applies to projects that disturb (temporary or permanent) the bed or banks of a protected stream or watercourse, or to fill or dredge activities in navigable waters of the state, below the mean high water level, including adjacent and contiguous marshes and wetlands.
Coastal Erosion Management Permit Program	NYSDEC	Regulates activities within nearshore areas, beaches, dunes, bluffs, and structural hazard areas.
The Clean Water Act Section 404 permit, Nationwide Permit (NWP), New York State Regional Conditions	US Army Corps of Engineers, Buffalo or New York District	Certain activities cannot be authorized under the NWP program in Critical Resource Waters, which include: all waters in the East-of-Hudson Watershed of the New York City Water Supply and Hudson River National Estuarine Research Reserves: Piermont Marsh, Iona Island, Tivoli Bay, and Stockport Flats. (USACE, 2012a)
Wild, Scenic and Recreational Rivers (WSRR) Act	NYSDEC	Applies to regulated activities, such as public utility major uses, which cross the designated Scenic or Recreational river, or are within 500 feet of the river.
	Adirondack Park Agency (APA)	APA regulations apply to the designated rivers and lands adjoining them, up to 0.25 miles from the edge of the river.
Protection of Waters	NYSDEC	In accordance with Section 401 of the Clean Water Act, activities that may result in a discharge to waters of the U.S. require a Water Quality Certification from NYSDEC indicating that the proposed activity will not violate water quality standards.
State Pollutant Discharge Elimination	NYSDEC	Point source discharges of wastewater into surface or groundwater, including the intake and discharge of water for

State Law/Regulation	Regulatory Agency	Applicability
System (SPDES) program		cooling purposes, stormwater discharge, and construction activities that disturb one or more acres require a SPDES permit.

Sources: (NYSDEC, 2015b) (NYSDEC, 2015i) (NYSDEC, 2015j) (NYSDEC, 2015k) (APA, 2013a) (NYSDEC, 2015l) (NYSDEC, 2015m)

11.1.4.3 Environmental Setting: Surface Water

Surface water resources are lakes, ponds, rivers, and streams, as well as estuarine[65] and coastal waters. According to the NYSDEC, "New York has more than 87,000 miles of rivers and streams, nearly 7,900 lakes, ponds, and reservoirs, over 1,530 square miles of estuaries, 600 miles of Great Lakes coastline, and about 120 miles of Atlantic Ocean coastline" (NYSDEC, 2015n). These surface waters supply drinking water; provide flood control and aquatic habitat; and support recreation, tourism, agriculture, fishing, power generation, and manufacturing across the state (NYSDEC, 2015o).

Watersheds

Watersheds, or drainage areas, consist of surface water and all underlying groundwater, and encompass an area of land that drains all the streams and rainfall to a common outlet (e.g., reservoir, bay). New York's waters (lakes, rivers, and streams) are divided into 17 major watersheds, or drainage basins (Figure 11.1.4-1). New York Appendix A, Table A-1: Characteristics of New York's Watersheds, provides detailed information on the state's major watersheds, as defined by NYSDEC. Visit www.dec.ny.gov/lands/26561.html for information and additional maps about each NYSDEC watershed's location, size, and water quality (NYSDEC, 2015p).

The St. Lawrence River Watershed lies along the northern border with Canada. Within New York, this watershed drains the northern and western Adirondack Mountains and the lake plain region of the St. Lawrence Valley. In the southeastern corner of the state, the Lower Hudson River Watershed extends from the Troy Dam at the union of the Mohawk River to the Battery at the southern end of Manhattan. Within this watershed, approximately 150 miles of the Hudson River is considered a tidal estuary, rather than a river. To the west, the Niagara River/Lake Erie Watershed encompasses approximately 90 miles of Lake Erie shoreline, which represents the western boundary of the state. In addition, the Oswego River/Finger Lakes Watershed is one of the largest in New York and includes the drainages of the Oswego, Oneida, Seneca, and Clyde rivers. In this watershed, lakes make up about six percent of the total surface area (NYSDEC, 2015p).

[65] Estuarine: related to an estuary, or a "partially enclosed body of water where fresh water from rivers and streams mixes with salt water from the ocean. It is an area of transition from land to sea." (USEPA, 2015a)

Figure 11.1.4-1: Major New York Watersheds, defined by NYSDEC, and Surface Waterbodies

Freshwater

As shown in Figure 11.1.4-1, there are 11 major rivers in New York: Niagara, Allegheny, Genesee, Oswego, Chemung, St. Lawrence, Black, Susquehanna, Delaware, Mohawk, and Hudson. The St. Lawrence River drains north from the Great Lakes into the North Atlantic Ocean. The Delaware River serves as the border between New York and Pennsylvania. At 306 miles long, the Hudson River is the longest river in the state (USGS, 1981). New York also contains more than 6,700 natural lakes and ponds. There are about 75 lakes that are at least 1 square mile and about 10 natural freshwater lakes of 10 square miles or more (NYSDHSES, 2014b). Some of the state's large lakes and dammed reservoirs provide flood control, hydropower[66] generation, and drinking water sources (USEPA, 2009).

The Great Lakes form the largest surface freshwater system on the planet spanning more than 94,000 square miles of surface area (NOAA, 2015a). According to the NYSDEC, "about 80 percent of New York's fresh surface water, over 700 miles of shoreline, and 40 percent of New York's land area expanding over 33 counties are contained in the drainage basins of Lake Ontario, Lake Erie, and the St. Lawrence River" (NYSDEC, 2015q). Of the five Great Lakes, Lake Ontario and Lake Erie border New York.

- Lake Ontario straddles the Canada/U.S. border, with the Province of Ontario on the north shore and the state of New York on the south shore. As the smallest of the Great Lakes, Lake Ontario has an average depth of 283 feet, and a maximum depth of 802 feet (USEPA 2012a). Water flows into Lake Ontario predominately from Lake Erie through the Niagara River. Legacy discharges of toxic chemicals into the lake and its tributaries have resulted in elevated levels of polychlorinated biphenyls (PCB) and the insecticide Mirex, leading to fish consumption advisories for many species. Runoff entering the lake through its tributaries and from nearby farms have also lead to excessive nutrients, specifically phosphates and nitrates; the runoff results in problematic algae growth, which negatively affects aquatic species and water quality (this process is called eutrophication[67]) (NYSDEC, 2015r).

- Lake Erie, the second smallest and shallowest of the Great Lakes, has an average depth of 82 feet and a maximum depth of 210 feet. Most of the lake's water inflow comes from the Detroit River and the remaining from tributaries and precipitation. The high levels of urbanization[68] and industrialization surrounding the lake have led to impaired water quality in the lake. Wastewater runoff from sewage treatment plants and excess sediment loading from agriculture and urbanization have affected water quality, resulting in eutrophication, excessive algae growth, and aquatic habitat loss. Industrial chemicals, such as PCBs, chlordane, and other toxic substances, have also degraded water quality in the lake (NYSDEC, 2005a).

[66] Hydropower: "electrical energy produced by falling or flowing water." (USEPA, 2004)

[67] Eutrophication: the process where a body of water acquires a high concentration of nutrients, especially phosphates and nitrates, which can lead to excessive growth of algae. (USGS, 2014k)

[68] Urbanization: "the process where an area of land becomes more urban in character, developed, and otherwise changed to more closely resemble a city or town." (USEPA, 2015a)

NYSDEC works with local, federal, and international agencies to protect and restore the Great Lakes. In 2012, the governments of the United States and Canada committed to develop and implement the Lakewide Action and Management Plans (LAMP) for the Great Lakes, including Lake Erie and Lake Ontario. The LAMPs identify priority environmental concerns, funding opportunities, and detail action and management plans to address the concerns (NYSDEC, 2015q).

Estuarine and Coastal Waters

Estuaries (including bays and tidal rivers) are bodies of water that provide transition zones between fresh river water and saline ocean water. Barrier islands, sand bars, and other landmasses protect estuaries, including those in New York, from ocean waves and storms. New York's estuarine environments support a variety of habitats, including tidal wetlands, mudflats, rocky shores, oyster reefs, freshwater wetlands, sandy beaches, and eelgrass beds, and are a critical part of the lifecycle of many different plant and animal species (USEPA, 2012b).

New York has three distinct coastal water environments: the marine environment south of Long Island and the New York City metropolitan area; the tidal estuarine environment of the Hudson River and Long Island Sound; and the freshwater environment of the Great Lakes-St. Lawrence region. New York's total coastal area encompasses over 5,000 miles (NYSDEC, 2015s). The U.S. Environmental Protection Agency (USEPA), NYSDEC and other state agencies, and local municipalities have developed management plans to address areas of concern and to develop protection and restoration strategies for each of these systems (NYSDEC, 2015t). Information on New York's estuaries is available on the NYSDEC Estuary Management Programs site (www.dec.ny.gov/lands/4934.html).

New York has five major estuaries, each located in the southeastern corner of the state (Figure 11.1.4-2).

- The **Hudson River Estuary** stretches 153 miles from Troy to New York Harbor and includes the Hudson River's tributaries and surrounding watershed. The estuary serves as important spawning and nursery grounds for more than 200 species of fish, such as striped bass (*Morone saxatilis*), American shad (*Alosa sapidissima*), Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*), and shortnose sturgeon (*Acipenser brevistrum*), as well as tidal freshwater wetlands (NYSDEC, 2015u). Several major power generating facilities, petroleum terminals, and cement plants are located along the banks of this estuary and discharges from these facilities have affected the estuary's water quality and sediments. Notably, "between 1947 and 1977, General Electric released about 1.3 million pounds of PCBs into the Hudson River from their plants in Fort Edward and Hudson Falls. After 1977, PCBs continued to enter the Hudson from subsurface contamination from beneath the Hudson Falls plant, adding to the burden of earlier discharges in the river bottom." Concentrations of PCBs were found in fish throughout the food chain, resulting in health concerns for humans and wildlife (NYSDEC, 2015v). Current management goals for the estuary focus on controlling invasive species, sediment, and erosion control (NYSDEC, 2015u). More information on the Hudson River Estuary Program is available at www.dec.ny.gov/lands/4920.html.

- The **New York-New Jersey Harbor Estuary** is located at the mouth of the Hudson River and meets with several other smaller rivers (East, Hackensack, and Raritan) before opening into the New York Bight and Long Island Sound. The estuary watershed encompasses the waters of New York Harbor and the tidally influenced portions of all rivers and streams that empty into the New York-New Jersey Harbor (New York New Jersey Harbor and Estuary Program, 2015). In 1998, the USEPA's National Estuary Program (NEP) recognized the New York-New Jersey Harbor as an Estuary of National Significance (USEPA, 2014a). The New York-New Jersey Harbor Estuary's Comprehensive Conservation and Management Plan (CCMP) identified five areas of concern and management actions: habitat loss and degradation, toxic contamination/dredged material management, pathogen[69] contamination, floatable debris, and nutrient organic enrichment (NYSDEC, 2015w). For more information on the New York-New Jersey Harbor Estuary and CCMP, visit http://water.epa.gov/type/oceb/nep/index.cfm#tabs-2.

- The **Long Island South Shore Estuary Reserve** watershed is a 326-square mile estuary between the Queens/Nassau County line eastward approximately 75 miles to Suffolk County. This geographically diverse estuary provides productive habitats from shallow, bays and tidal tributaries, which support "the largest concentration of water-dependent businesses" in New York (NYSDEC, 2015x). The primary concern in this estuary is nonpoint source pollution, as pathogens, eutrophication, and sedimentation affect water quality and aquatic habitat throughout the estuary. The Long Island South Shore Estuary Reserve's CCMP addresses five areas of concern: water quality; living resources; public use and enjoyment; estuary-related economy; and education, outreach, and stewardship (NYSDEC, 2015x). More information on the Long Island South Shore Estuary is available at www.dec.ny.gov/lands/31847.htm.

- The **Long Island Sound** watershed covers 1,320-square miles with 600 miles of coastline located in one of the most densely populated areas in the United States, within the jurisdictions of both New York and Connecticut (NYSDEC, 2015y). The estuary provides habitat to "more than 1,200 species of invertebrates, 170 species of fish and dozens of species of migratory birds live [there] at least part of the year" (Long Island Sound Study, 2015). In 1988, the USEPA's NEP identified Long Island Sound as an Estuary of National Significance. In cooperation with USEPA and NEP, the Long Island Sound released a CCMP in 1994 to guide restoration and management actions in the estuary. Key issues identified in the CCMP include hypoxia (low dissolved oxygen), toxic substances, pathogens, floatable debris, land use and development, and management and conservation of living resources and their habitats within the estuary (USEPA, 2014a). More information on the

[69] Pathogen: a bacterium, virus, or other microorganism that can cause disease. (USEPA, 2015a)

Long Island Sound estuary and the Long Island Sound Study and Management Plan is available at http://water.epa.gov/type/oceb/nep/index.cfm#tabs-2.

- The **Peconic Estuary** watershed is 80 miles east of New York City, between the north and south forks of Long Island, and includes more than 247 square miles. About 25 percent of the estuary is undeveloped land, which supports more than 111 rare plant and animal species (Peconic Estuary Program, 2015). The USEPA's NEP declared the Peconic Estuary an Estuary of National Significance in 1993. The estuary's CCMP, finalized in 2001, includes 340 management actions. Areas of concern in the estuary include Brown Tide (algal bloom), nutrients, habitat and living resources, pathogens, toxic pollutants, and critical lands protection (USEPA, 2014a). Visit http://water.epa.gov/type/oceb/nep/index.cfm#tabs-2 for more information on the Peconic Estuary.

11.1.4.4 Sensitive or Protected Waterbodies

Wild and Scenic Rivers

The Upper Delaware River, between Hancock and Port Jervis (Figure 11.1.4-1) is a federally designated National Wild and Scenic River in New York (National Wild and Scenic Rivers System, 2015a). At 73.4 miles, the Upper Delaware River is one of the longest, free-flowing (undammed) rivers in the eastern United States. The river's free-flowing character and cold water makes it an important habitat for several fish species, including trout (NPS, 2015b). See Section 11.1.6 for detailed information on New York fisheries resources.

As an amendment to the Wild Scenic and Rivers Act, the Genesee River Protection Act of 1989, designated the portion of the Genesee River within Letchworth Gorge State Park, beginning at the southern boundary of the park and extending downstream to the Mt. Morris Dam, as a permanent Wild and Scenic Study River[70] (National Wild and Scenic Rivers System, 2015a). According to the designation, the approximately 17-mile section of the Genesee River is an integral part of the Gorge's "archeological sites of sacred significance to the Seneca Nation, historic areas, endangered plant communities, and diverse recreation uses" (P.L. 101-175, 1989). The Wild and Scenic Rivers Act provides Study Rivers the same level of protection as National Wild and Scenic Rivers (USFS, 2004).

[70] Under Section 5(a)(1), "Congress authorizes the study of select rivers and directs one of four federal river-administering agencies to conduct the study, as outlined in Sections 4(a) and 5(c) of the Wild & Scenic Rivers Act." To date, studies have led to 48 Wild & Scenic River designations. Public Law 109-370 initiated the Lower Farmington River and Salmon Brook NPS study in 2007. (National Wild and Scenic Rivers System, 2015a)

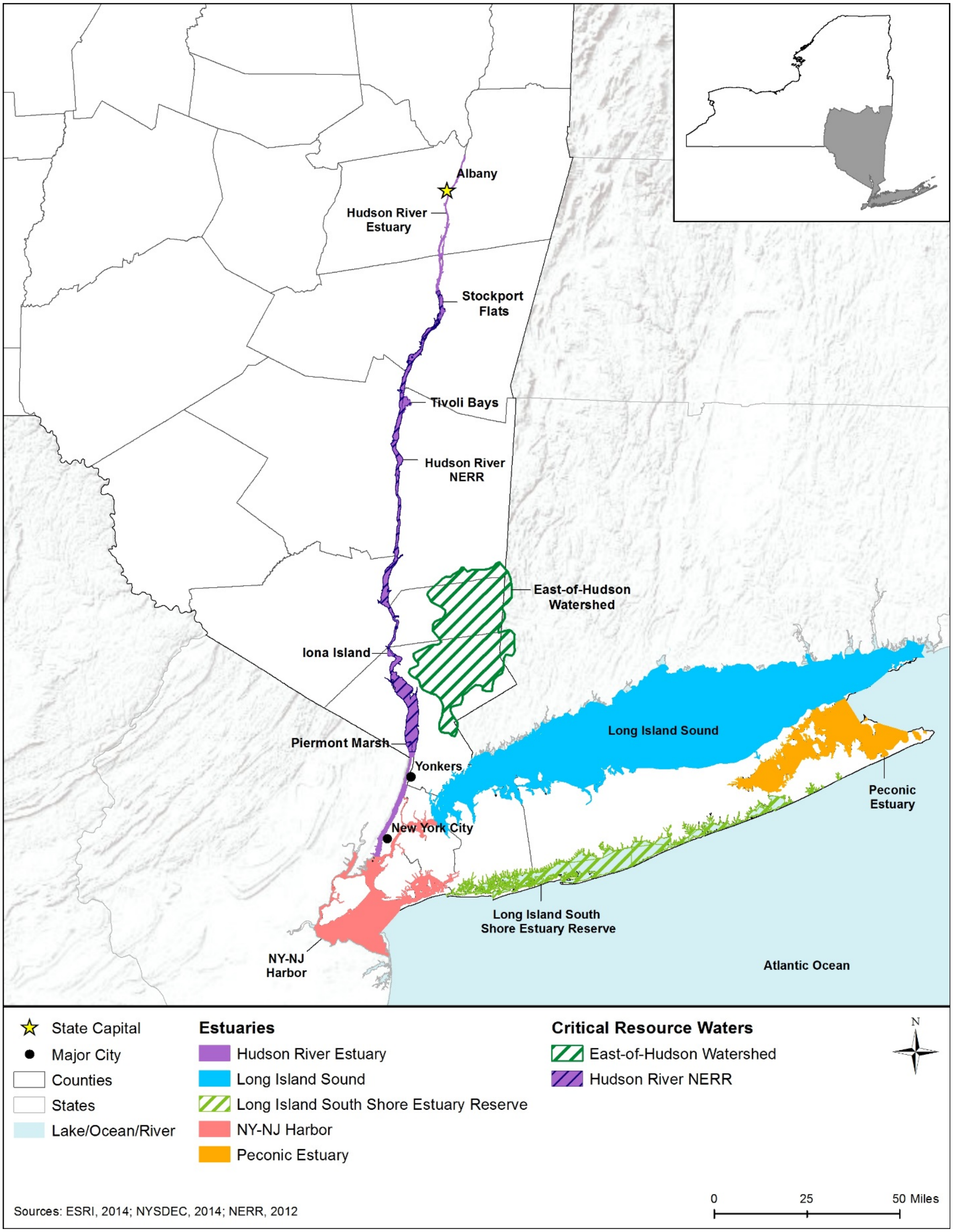


Figure 11.1.4-2: New York's Estuaries and Critical Resource Waters

In addition to federally designated Wild and Scenic Rivers, New York's Wild, Scenic, and Recreational Rivers Act protects rivers that "possess outstanding scenic, ecological, recreational, historic, and scientific values" (NYSDEC, 2015z). As a land management tool, NYSDEC can designate specific areas with recreational rivers as communities, which affords the area more flexibility in land use planning than a recreational river designation (NYSDEC, 2015z). Statewide, there are 94 rivers or segments, totaling more than 1,300 miles, designated as Wild, Scenic, or Recreational Rivers in New York; New York Appendix A, Table A-2: New York Wild, Scenic, and Recreational Rivers, identifies each of these rivers (NYSDEC, 2015z) (APA, 2013a). Most of these rivers or segments are in Adirondack Park, in the northeastern area of the state.

State Designated Critical Resource Waters[71]

In 2002, New York designated all waterbodies within the East-of-Hudson portion of the New York City water supply watershed as Critical Resource Waters[72] (USACE, 2012a) (Figure 11.1.4-2). The New York City watershed serves as the drinking water supply for approximately nine million New Yorkers and originates in a terminal reservoir within the East-of-Hudson portion of the watershed, making this area of the watershed of particular environmental significance to the state (NYC, 2013a).

Three large upstream reservoir systems serve New York City's residents. These reservoir systems include:

- The Croton reservoir system, which supplies 10 percent of New York City's drinking water, is in Westchester, Putnam, and Dutchess counties, and includes 12 reservoirs and 3 controlled lakes.
- The Catskill reservoir system, which supplies up to 40 percent of New York City's drinking water, consists of two reservoirs, and is in parts of Greene, Ulster, and Schoharie counties, sited 100 miles north of New York City.
- The Delaware system, located over 100 miles from New York City in parts of Delaware, Ulster, and Sullivan counties, supplies up to 50 percent of the City's drinking water, and includes four reservoirs with the largest holding over 140 billion gallons of water (NYC, 2013a).

Additionally, portions of the East-of-Hudson watershed serve as habitat for several threatened and endangered species, rare natural communities, and other natural heritage areas (NYCDEP, 2009). By having the critical resource water designation in the area, additional permits may be required in coordination with proactive land management (see Section 11.2.4.).

The other designated New York critical resource water is a 100-mile stretch of the Hudson River Estuary (between the Tappan Zee Bridge and the Troy Dam) that is part of the National Estuarine Research Reserve (NERR) System (USACE, 2012a). Comprised of four wetlands,

[71] Critical Resource Waters include NOAA-designated marine sanctuaries, National Estuarine Research Reserves, National Wild and Scenic Rivers, critical habitat for Federally listed threatened and endangered species, coral reefs, State natural heritage sites, and outstanding national resource waters or other waters officially designated by a State as having particular environmental or ecological significance and identified by the District Engineer after notice and opportunity for public comment. (ILDNR, 2015)

[72] Critical resource waters are areas requiring project-specific permits for many activities.

Piermont Marsh, Iona Island, Tivola, and Stockport Flats (Figure 11.1.4-2), this portion of the river is subject to daily tides, regular wave action from recreational and commercial boats, flooding, and storm surges, and therefore is subject to severe bank erosion. The objective of the Hudson River NERR is to gain an understanding of the economic and environmental tradeoffs of different approaches to managing shoreline erosion and change, and provide guidance to stakeholders on different approaches to shoreline stabilization (NOAA, 2015b).

11.1.4.5 Impaired Waterbodies

Several elements, including temperature, dissolved oxygen, suspended sediment, nutrients, metals, oils, observations of aquatic wildlife communities, and sampling of fish tissue, are used to evaluate water quality. Under Section 303(d) of the Clean Water Act, states are required to assess water quality and report a listing of impaired waters,[73] the causes of impairment, and probable sources. Table 11.1.4-2 summarizes the water quality of New York's assessed major waterbodies by category, percent impaired, designated use,[74] cause, and probable sources. Figure 11.1.4-3 shows the Section 303(d) waters in New York as of 2014.

As shown in Table 11.1.4-2, various sources affect New York's waterbodies, causing impairments. For example, Otisco Lake, Owasco Lake, and Skaneateles Lake (all Finger Lakes) are areas of concern according to the USEPA, due mainly to nonpoint source pollution[75] from agriculture and residential land use, and streambank erosion (USEPA, 2014b). More than half of New York's estuaries and bays are impaired. Designated uses of the impaired estuaries and bays include aquatic life, fishing, habitat/hydrology, primary and secondary contact recreation, and shellfish harvesting. Legacy discharges[76] of PCBs, dioxins, and pesticides have affected all of New York's Great Lakes shoreline, which have resulted in fish consumption advisories for many species (USEPA, 2015b) (NYSDEC, 2015aa).

[73] Impaired waters: waterways that do not meet state water quality standards. Under the CWA, Section 303(d), states, territories, and authorized tribes are required to develop prioritized lists of impaired waters. (USEPA, 2015a)

[74] Designated Use: an appropriate intended use by humans and/or aquatic life for a waterbody. Designated uses may include recreation, shellfishing, or drinking water supply. (USEPA, 2015a)

[75] Nonpoint source pollution: a source of pollution that does not have an identifiable, specific physical location or a defined discharge point. Non-point source pollution includes nutrients that run off croplands, lawns, parking lots, streets and other land uses. It also includes nutrients that enter waterways via air pollution groundwater, or septic systems. (USEPA, 2015a)

[76] Legacy discharges refers to a variety of unregulated direct discharges of industrial chemicals or toxic compound waste disposal practices in the 1960s and 1970s into lakes, rivers, or waterways.

Table 11.1.4-2: Section 303(d) Impaired Waters of New York, 2014

Water Type[a]	Amount of Waters Assessed[b] (Percent)	Amount Impaired (Percent)	Designated Uses of Impaired Waters	Top Causes of Impairment	Top Probable Sources for Impairment
Rivers and Streams	66%	12.5%	aquatic life, recreation, fishing, and habitat/hydrology	nutrients, sediment, pathogens[c]	animal feeding operations, streambank modifications/ destabilzation, and municipal point source discharges
Lakes, Reservoirs, and Ponds	73%	55%	aquatic life, fishing, habitat/hydrology, and primary and secondary contact recreation	mercury, nutrients such as phosphorus, and pathogens	atmospheric deposition,[d] animal feeding operations, and urban runoff/storm sewers
Estuaries and Bays	100%	60%	aquatic life, recreation, fishing, and habitat/hydrology	pathogens, nutrients such as nitrogen and phosphorus, and toxic organics	urban runoff/storm sewers, municipal point source discharges, and migratory species
North Atlantic Ocean coastal shoreline	21%	8.6%	aquatic life, habitat/hydrology, primary and secondary contact recreation, and shellfish	pathogens resulting from urban runoff/storm sewers and municipal point source discharges	urban runoff/storm sewers, and municipal point source discharges
Great Lakes shoreline	100%	100%	aquatic life, recreation, fishing, habitat/hydrology, primary and secondary contact recreation	polychlorinated biphenyls, dioxins, and pesticides	contaminated sediments, hydromodifications (e.g., impacts from hydrostructure flow regulations/modification), and onsite wastewater treatment systems (e.g., septic systems)

Source: (USEPA, 2015b)
[a] Some waters may be considered for more than one water type
[b] New York has not assessed all waterbodies within the state.
[c] Pathogen: a bacterium, virus, or other microorganism that can cause disease (USEPA, 2015a)
[d] Atmospheric deposition: the process by which airborne pollutants settle onto to the earth's surface and pollutants travel from the air into the water through rain and snow (“wet deposition”), falling particles (“dry deposition”), and absorption of the gas form of the pollutants into the water (USEPA, 2015a)

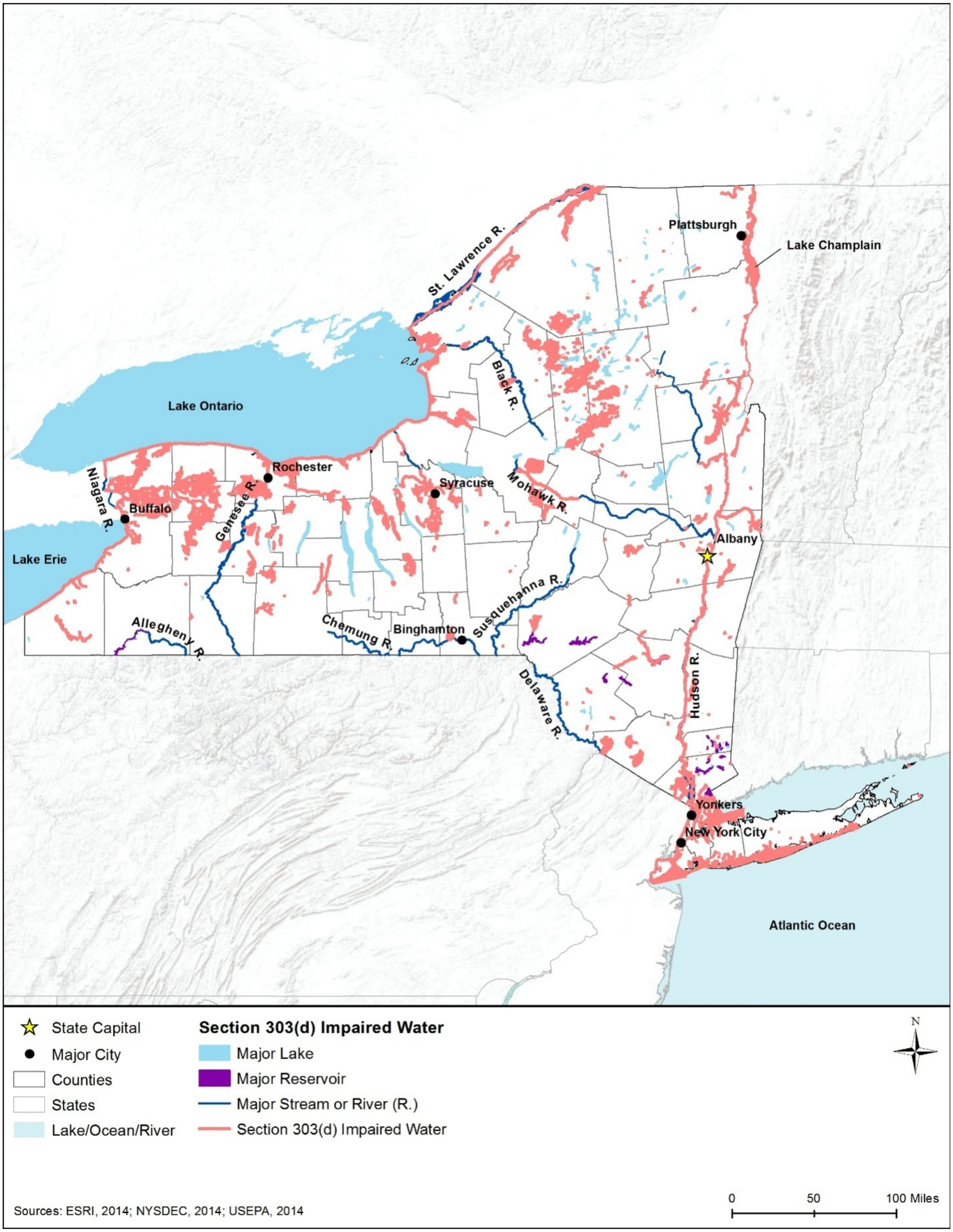


Figure 11.1.4-3: Section 303(d) Impaired Waters of New York, 2014

NYSDEC has developed a Waterbody Inventory/Priority Waterbodies List (WI/PWL) that characterizes the water quality for all waterbodies in the state (lakes, rivers, streams, estuaries, and coastlines). (Visit www.dec.ny.gov/chemical/36730.html for results from New York's WI/PWLs past sampling and assessment efforts.) Based on the WI/PWL, urban/stormwater runoff, contaminated sediment, inadequate wastewater treatment infrastructure, and atmospheric deposition (including acid rain) are the most probable sources of impaired waters within the state. The leading source of impairment is due to urban stormwater runoff for almost 40 percent of all waterbodies assessed throughout the state, with the greatest impact in and around major metropolitan areas, such as New York City, Buffalo, Syracuse, Rochester, and Albany. Discharges from wastewater treatment systems affect almost 25 percent of all waterbodies in the state because of inadequate wastewater infrastructure and treatment, typically occurring in more populated areas (NYSDEC, 2015ab).

11.1.4.6 Floodplains

Floodplains are lowlands along inland or coastal waters, including flood-prone areas of offshore islands. The Federal Emergency Management Agency (FEMA) defines a floodplain or flood-prone area as "any land area susceptible to being inundated by water from any source" (44 Code of Federal Regulations [CFR] 59.1) (FEMA, 2000). Through FEMA's flood hazard mapping program, the agency identifies flood hazards and risks associated with the 100-year flood, which is defined as "a flood that has a 1 percent chance of occurring in any given year," to allow communities to prepare and protect against flood events (FEMA, 2013).

Floodplains provide suitable and sometimes unique habitat for a wide variety of plants and animals, and are typically more biologically diverse than upland areas due to the combination of both terrestrial and aquatic ecosystems. Vegetation along stream banks provides shade, which helps to regulate water temperature for aquatic species. During flood events, sediment and debris settle out and collect on the floodplain, enriching the soil with additional nutrients. Pollutants from floodwater runoff are also filtered by floodplain vegetation and soils; thereby improving water quality. Furthermore, floodplains protect natural and built infrastructure by providing floodwater storage, erosion control, water quality maintenance, and groundwater recharge. Historically, floodplains have been favorable locations for agriculture, aquaculture, and forest production due to the relatively flat topography and nearby water supply. Floodplains can also offer recreational activities, such as boating, swimming, and fishing, as well as hiking and camping (FEMA, 2014a).

There are two primary types of floodplains in New York.

- **Riverine and lake floodplains** occur along rivers, streams, or lakes where overbank flooding may occur, inundating adjacent land areas. In mountainous areas, such as the Adirondacks, floodwaters can build and recede quickly, with fast moving and deep water. Flooding in these areas can cause greater damage than typical riverine flooding due to the high velocity of water flow, the amount of debris carried, and the broad area affected by floodwaters. In contrast, flatter floodplains may remain inundated for days or weeks, covered by slow-moving and shallow water (FEMA, 2014b).

- **Coastal floodplains** in New York border the Atlantic Ocean coastline of New York City and Long Island, the Hudson River Estuary, and the shorelines of Lake Ontario and Lake Erie. Coastal flooding can occur when strong wind and storms, usually nor'easters and hurricanes, increase water levels on the adjacent shorelines (FEMA, 2013). Lake coastal flooding can occur in New York when strong wind and storms increase water levels on the shores of Lake Erie and Lake Ontario (NYSDHSES, 2014b). In addition, a storm surge event that takes place during high tide can cause floodwaters to exceed normal tide levels, resulting from strong winds preventing tidal waters to recede in conjunction with additional water pushed toward the shore, as was the case during Hurricane Sandy.

Flooding is the leading cause for disaster declaration by the President in the U.S. and results in significant damage throughout the state annually (NOAA, 2015c). There are several causes of flooding in New York, often resulting in loss of life and damage to property, infrastructure, agriculture, and the environment. These include severe rain events, rapid snowmelt, hurricanes, debris and ice jams, over-development/impervious[77] surfaces, deforestation,[78] loss of wetlands, climate change, and dam failure (NYSDEC, 2015ac).

Although some areas, such as floodplains, are more prone to flooding than others, no area in the state is exempt from flood hazards. Based on historical flooding and flood disaster declarations, flood problems are most severe in the Delaware, Chemung, Susquehanna, Genesee, Hudson, Mohawk, and Allegheny River watersheds (see Figure 11.1.4-1). There are 1,480 communities designated as flood-prone areas in New York. Every county in the state has experienced at least 25 flood disasters over the past half century. The estimated flood damages resulting from Hurricane Sandy exceed $100M annually related to economic losses, disruption of commerce, unemployment (e.g., flooded workplaces), flooded transportation systems, disaster relief expenses, and cleanup (NYSDHSES, 2014b).

Hurricane Sandy

In 2012, Hurricane Sandy traveled through 24 states, from Florida to Maine, causing millions of dollars in damage, particularly in New York and New Jersey coastal communities. On October 29, 2012, its storm surge hit New York City, immobilizing residents; flooding streets, subways, railways, and tunnels; and eliminating power resources in and around the city (NYSDHSES, 2014b). The size and strength of Hurricane Sandy created an immense tidal surge, that when combined with spring high tide, was over 14 feet above Mean Lower Low Water in coastal communities in and surrounding New York City (NYC, 2013b)

Source: (USGCRP, 2014a)

[77] Impervious: a hardened surface or area that does not allow water to pass through. For example, roads, rooftops, driveways, sidewalks, pools, patios, and parking lots are all impervious surfaces. (USEPA, 2015a)
[78] Deforestation: the removal of a forest, woodland, or stand of trees without adequate replanting or natural regeneration. (USEPA, 2015a)

Local communities often have floodplain management or zoning ordinances that restrict development within the floodplain. FEMA provides floodplain management assistance, including mapping of 100-year floodplain limits, to approximately 1,600 communities in New York through the National Flood Insurance Program (NFIP) (FEMA, 2015a). Established to reduce the economic and social cost of flood damage, the NFIP encourages communities "to adopt and enforce floodplain management regulations and to implement broader floodplain management programs" and allows property owners in participating communities to purchase insurance protection against losses from flooding (FEMA, 2015b). As an incentive, communities can voluntarily participate in the NFIP Community Rating System (CRS), which is a program that rewards communities for doing more than the minimum NFIP requirements for floodplain management by reducing flood insurance premiums. As of May 2014, New York had 39 communities participating in the CRS (FEMA, 2014c).[79]

11.1.4.7 Groundwater

Groundwater systems are sources of water that result from precipitation infiltrating the ground surface, and includes underground water that occupies pore spaces between sand, clay, or rock particles. An aquifer is a permeable geological formation that stores or transmits water to wells and springs. Groundwater is contained in either confined (bound by clays or nonporous bedrock) or unconfined (no layer to restrict the vertical movement of groundwater) aquifers (USGS 1999b). When the water table reaches the ground surface, groundwater will reappear as either streams, surface bodies of water, or wetlands. This exchange between surface water and groundwater is an important feature of the hydrologic (water) cycle.

New York's principal aquifers[80] consist of carbonate-rock[81] and sandstone aquifers[82], sand and gravel aquifers of alluvial [63] and glacial origin,[83] and unconsolidated coastal-plain aquifers. Approximately six million residents draw drinking water from New York's groundwater resources. Generally, the water quality of New York's aquifers is suitable for drinking and daily water needs. Statewide, the most serious threats to groundwater quality include pesticide applications, leaking underground storage tanks, inadequate or failing onsite septic systems,

[79] A list of the 39 CRS communities can be found in the most recent FEMA CRS report dated May 1, 2014 (FEMA, 2014c) and additional program information is available from FEMA's NFIP CRS website (www.fema.gov/national-flood-insurance-program-community-rating-system).

[80] In this PEIS, the term principal aquifer refers to the USGS definition ("A regionally extensive aquifer or aquifer system that has the potential to be used as a source of potable water.") for nationwide consistency (USGS, 2003d). In contrast, the NYSDEC's groundwater management program has different meanings for "principal" and "primary" aquifers, which are defined by the amount of water they produce. (NYSDEC, 2015bo)

[81] Carbonate-rock aquifers typically consist of limestone with highly variable water-yielding properties (some yield almost no water and others are highly productive aquifers). (Olcott, 1995a)

[82] Sandstone aquifers form from the conversion of sand grains into rock caused by the weight of overlying soil/rock. The sand grains are rearranged and tightly packed, thereby reducing or eliminating the volume of pore space, which results in low-permeability rocks such as shale or siltstone. These aquifer types are highly productive in many places and provide large volumes of water. (Olcott, 1995b)

[83] Sand and gravel aquifers of alluvial (sand, silt, or gravel materials left by river waters) and glacial origin are highly productive aquifers in the northern part of the country, consisting of mostly sand and gravel deposits formed by melting glaciers. (USGS, 2015e)

discharge from hazardous waste landfills and industrial contamination, chemical spills, and saltwater intrusion (saltwater moving into freshwater aquifers) (NYSDEC, 2012b).

Table 11.1.4-3**:** provides details on aquifer characteristics in the state; Figure 11.1.4-4 shows New York's principal and sole source aquifers. Two other aquifers, Early Mesozoic Basin and Valley and Ridge aquifer, are situated in small portions of the southern Hudson River Valley, as shown in Figure 11.1.4-4. These two aquifers are more extensive in other states and represent a relatively small area within New York, and thus are not discussed in detail. For more information on the Early Mesozoic Basin aquifer, see Section 10.1.4, New Jersey Groundwater. For more information on the Valley and Ridge aquifer, see Section 12.1.4, Pennsylvania Groundwater.

Table 11.1.4-3: Description of New York's Principal Aquifers

Aquifer Type and Name	Location in State	Groundwater Quality
New York and New England Carbonate-rock Consolidated bedrock of limestone, dolomite, and marble and are generally soluble.	Occurs mainly in western (northern part of Lake Erie-Niagara River Basin) and northern New York (St. Lawrence Valley, Adirondacks), as well as the St. Lawrence and the Mohawk River the valleys	The water is hard and saltwater is present in places, especially at shallow depths. Overall, the water is suitable for most uses, though carbonate can make groundwater acidic. Where exposed, carbonate-rock aquifers are susceptible to contamination from the land surface because of their enhanced absorbency.
New York Sandstone Sedimentary rocks make up this confined aquifer system	Northern part of the state (near Potsdam and Adirondacks), along the Great Lakes, in the St. Lawrence Valley, the Mohawk Valley	Contain very hard water with high sulfate and calcium concentrations. Suitable for drinking and most uses. Large chloride concentrations may also be present, most likely from road deicing solutions. Although these aquifers are the least productive of the principal aquifers, they are important sources of domestic water supplies in areas where the surficial aquifer system is not present.
Aquifers of Alluvial and Glacial Origin These aquifers consist mainly of the sand, gravel, and bedrock eroded by the glaciers	Found beneath major river and stream valleys or lake plains and terraces, all over the state.	Suitable for most uses. In southern New York, water from the surficial aquifer system is hard and slightly basic (chalky) because the aquifers contain fragments of carbonate rocks. Elsewhere in New York, water from the surficial aquifer system is acidic and soft.
Northern Atlantic Coastal Plain Aquifer System Unconsolidated sediments (primarily clay, sand, and gravel) overlie igneous and metamorphic rocks. The Atlantic Coastal Plain aquifer system includes Upper glacial aquifer, Magothy aquifer, and, separated by an impermeable clay layer, is the Lloyd aquifer.	Underlies Long Island	Generally, the water is suitable for most uses, including drinking water. Iron concentrations are locally high, and the water is slightly acidic. Increased development has stressed the Island's groundwater aquifer system in the past. Because of the proximity to the marine coast, localized heavy pumping can cause saltwater intrusion (movement into the freshwater aquifer).

Sources: (Moody, Carr, Chase, & Paulson, 1986) (NYSDEC, 2015ad) (NYSDEC, 2015ae) (Olcott, 1995a) (Olcott, 1995b) (Stumm, Lange, & Candela, 2002) (USGS, 2015f) (USGS, 2015g)

Sole Source Aquifers

The USEPA defines sole source aquifers (SSA) as "an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer" and are areas with no other drinking water sources (USEPA, 2015c). New York has 10 designated SSAs within the state, including three that cross into New Jersey (as shown in Figure 11.1.4-4). Two of the SSAs, Brooklyn-Queens SSA and Nassau-Suffolk SSA, are part of the Long Island Aquifer system (USEPA, 2014c). Groundwater supplies are concentrated within Nassau and Suffolk counties, accounting for nearly three million users (NYS Department of Health, 2013). Designating a groundwater resource as an SSA helps to protect the drinking water supply in that area and requires reviews for all federally funded proposed projects to ensure that the water source is not jeopardized (USEPA, 2015c).

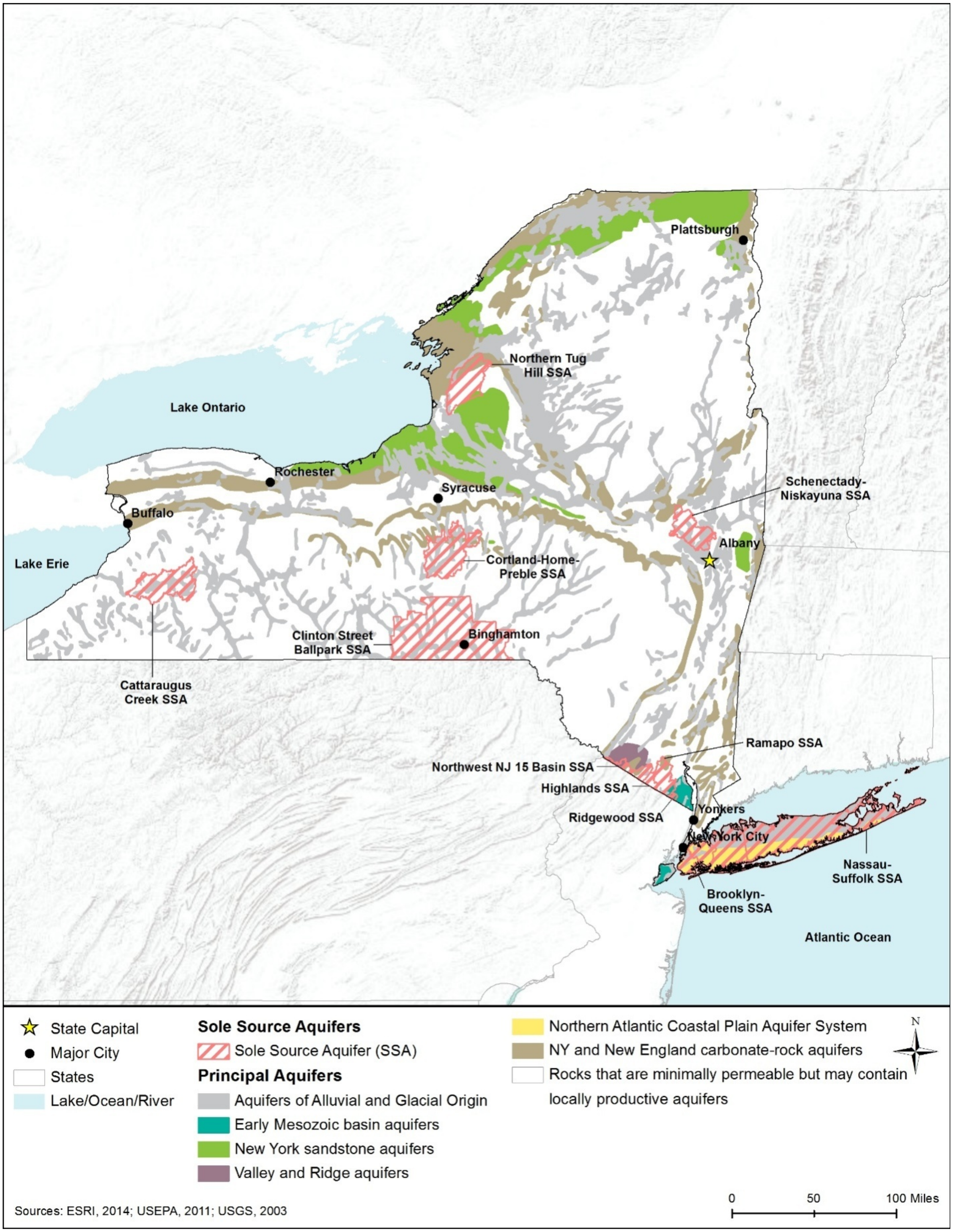


Figure 11.1.4-4: Principal and Sole Source Aquifers of New York

11.1.5 Wetlands

11.1.5.1 Definition of the Resource

The Clean Water Act (CWA) defines wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs[84] and similar areas" (40 CFR 230.3(t), 1993).

USEPA estimates that "more than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half of such species use wetlands at some point in their lives" (USEPA, 1995). In addition to providing habitat for many plants and animals, wetlands also provide benefits to human communities. Wetlands store water during flood events, improve water quality by filtering polluted runoff, help control erosion by slowing water velocity and filtering sediments, serve as points of groundwater recharge, and help maintain base flow in streams and rivers. Additionally, wetlands provide recreation opportunities for people, such as hiking, bird watching, and photography.

11.1.5.2 Specific Regulatory Considerations

Table 11.1.5-1 summarizes the major New York state laws and permitting requirements relevant to the state's wetlands.

Table 11.1.5-1: Relevant New York Wetland Laws and Regulations

State Law/Regulation	Regulatory Authority	Applicability
CWA Section 404 permit, NY regional requirements	U.S. Army Corps of Engineers (USACE), Buffalo or New York District	No authorized regulated activity can cause the loss of areas classified as a bog or fen,[85] due to the scarcity of this habitat in New York and the difficulty with in-kind mitigation.
		Certain activities in Critical Resource Waters are not authorized under the NWP program. Critical Resource Waters include all wetlands in the East of Hudson Watershed of the New York City Water Supply, and Hudson River NERR: Piermont Marsh, Iona Island, Tivoli Bay, and Stockport Flats.
Tidal Wetlands Act	NYSDEC	Regulated activities in tidal wetlands, as well as lands bordering on or lying beneath tidal waters including those now or formerly connected to tidal waters with listed vegetation, and adjacent areas (150-300 feet).
Freshwater Wetlands Act	NYSDEC	Regulated activities in freshwater wetlands 12.4 acres or larger in size or in smaller wetlands of unusual local importance. In addition, a buffer area of 100 feet surrounding the wetland requires a permit.
	APA	Wetlands of all sizes and certain activities within 100 feet of a wetland if they have the potential to affect the wetland negatively.

[84] Bog: "Characterized by spongy peat deposits, acidic waters, and a floor covered by a thick carpet of sphagnum moss. Bogs receive all or most of their water from precipitation rather than from runoff, groundwater, or streams. As a result, bogs are low in the nutrients needed for plant growth, a condition that is enhanced by acid forming peat mosses." (USEPA, 2015a)

[85] See Section 3.1.5.4 for a detailed description of bogs and fens.

State Law/Regulation	Regulatory Authority	Applicability
Protection of Waters Program	NYSDEC	Fill or dredge activities in wetlands (of any size) below mean high water.
		In accordance with CWA Section 401, activities that may result in a discharge to waters of the U.S. require a Water Quality Certification indicating that the activity will not violate water quality standards.

Sources: (USACE, 2012b) (NYSDEC, 2015af) (NYSDEC, 2015ag) (APA, 2013b) (NYSDEC 2015ah) (NYSDEC 2015ai)

11.1.5.3 Environmental Setting: Wetland Types and Functions

The USFWS National Wetlands Inventory (NWI) mapping adopted a national Wetlands Classification Standard (WCS) that classifies wetlands according to shared environmental factors, such as vegetation, soils, and hydrology, as defined in (Cowardin, Carter, Golet, & LaRoe, 1979). The WCS includes five major wetland systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. New York includes three of these systems, as detailed in Table 11.1.5-2. The first four of these include both wetlands and deepwater habitats but the Palustrine includes only wetland habitats. (USFWS, 2015a)

- The Marine System consists of open ocean, continental shelf, including beaches, rocky shores, lagoons, and shallow coral reefs. Normal marine salinity (saltiness) to hypersaline (more than 35 percent salty) water chemistry; minimal influence from rivers or estuaries. Where wave energy is low, mangroves, or mudflats may be present.
- The Estuarine System consists of deepwater tidal habitats and adjacent tidal habitats that usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean and the ocean water is at least occasionally diluted by freshwater runoff from the land.
- Riverine System includes all wetlands and deepwater habitats contained within a channel with two exceptions (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater.
- Lacustrine System includes inland water bodies that are situated in topographic depressions, lack emergent trees and shrubs, have less than 30 percent vegetation cover, and occupy at least 20 acres. Includes lakes, larger ponds, sloughs, lochs, bayous, etc.
- Palustrine includes all nontidal wetlands dominated by trees, shrubs, persistent emergent plants, or emergent mosses or lichens, and all wetlands that occur in tidal areas where the salinity is below 5 percent. The system is characterized based on the type and duration of flooding, water chemistry, vegetation, or substrate characteristics (soil types) (Cowardin, Carter, Golet, & LaRoe, 1979) (FGDC, 2013).

In New York, the two main types of wetlands are palustrine (freshwater) wetlands found on river and lake floodplains across the state, and estuarine/marine (tidal) wetlands around Long Island, New York City, and up the Hudson River to the dam at Troy, NY. Riverine[86]. Lacustrine[87] wetlands comprise approximately two percent of the wetlands in the state. Therefore, they are not discussed in detail in this PEIS.

Table 11.1.5-2: uses 2014 NWI data to characterize and map New York wetlands on a broad-scale. The data are not intended for site-specific analyses and are not a substitute for field-level wetland surveys, delineations, or jurisdictional determinations which may be conducted, as appropriate, at the site-specific level once those locations are known. As shown in Figure 11.1.5-1 and Figure 11.1.5-2, western and northern New York are predominately palustrine wetlands, while estuarine/marine wetlands are found in the southern portion of the state (Figure 11.1.5-3). The map codes and colorings in Table 11.1.5-2: correspond to the wetland types in the figures.

Table 11.1.5-2: New York Wetland Types, Descriptions, Location, and Amount, 2014

Wetland Type	**Map Code and Color**	**Description[a]**	**Occurrence**	**Amount (acres)[b]**
Palustrine forested wetland	PFO	PFO wetlands contain woody vegetation that are at least 20 feet tall. Floodplain forests, hardwood swamps, and silver maple-ash swamps are examples of PFO wetlands.	Adirondacks and forested lowlands within the state	1,653,516
Palustrine scrub-shrub wetland	PSS	Woody vegetation less than 20 feet tall dominates PSS wetlands. Thickets and shrub swamps are examples of PSS wetlands.	Throughout the state, often on river and lake floodplains	
Palustrine emergent wetlands	PEM	Palustrine emergent wetlands have erect, rooted, green-stemmed, annual, water-loving plants, excluding mosses and lichens, present for most of the growing season in most years. PEM wetlands include freshwater marshes, wet meadows, fens[88], prairie potholes, and sloughs.	Western part of the state and Hudson River Valley	285,735
Palustrine unconsolidated bottom	PUB	PUB and PAB are commonly known as freshwater ponds, and includes all wetlands with at least 25% cover of particles smaller than stones and a vegetative cover less than 30%.	Throughout the state and Coastal Plains (southern part of the state)	133,949
Palustrine aquatic bed	PAB	PAB wetlands include wetlands vegetated by plants growing mainly on or below the water surface line.		

86 Riverine systems include rivers, creeks, and streams contained in natural or artificial channels periodically or continuously containing flowing water.

87 Lacustrine systems are lakes or shallow reservoir basins of ponded waters in depressions or dammed river channels, with sparse or lacking persistent emergent vegetation, but including any areas with abundant submerged or floating-leaved aquatic vegetation.

88 Fens are nutrient-rich, grass- and sedge-dominated emergent wetlands that are recharged from groundwater and have continuous running water. (Edinger, et al., 2014)

Wetland Type	Map Code and Color	Description[a]	Occurrence	Amount (acres)[b]
Other Palustrine wetland	Misc. Types	Farmed wetland, saline seep[89], and other miscellaneous wetlands are included in this group.	Throughout the state	22,579
Riverine wetland	R	Riverine systems include rivers, creeks, and streams. They are contained in natural or artificial channels periodically or continuously containing flowing water.	Throughout the state	5,472
Lacustrine wetland	L2	Lacustrine systems are lakes or shallow reservoir basins generally consisting of ponded waters in depressions or dammed river channels, with sparse or lacking persistent emergent vegetation, but including any areas with abundant submerged or floating-leaved aquatic vegetation. These wetlands are less than 8.2 feet deep.	Coastal Plains, Finger Lakes	40,904
Estuarine and Marine intertidal wetland	E2/M2	These intertidal[c] wetlands include the areas between the highest tide level and the lowest tide level. Semidiurnal tides (two high tides and two low tides per day) periodically expose and flood the substrate. Wetland examples include vegetated and non-vegetated brackish (mix of fresh and saltwater), and saltwater marshes, shrubs, beaches, sandbars, or flats.	Around Long Island, New York City, and up the Hudson River to the dam at Troy, NY	40,134

Source: (Cowardin, Carter, Golet, & LaRoe, 1979) (USFWS, 2015a) (FGDC, 2013)

[a] The wetlands descriptions are based on information from the Federal Geographic Data Committee (FGDC)'s Classification of Wetland and Deepwater Habitats of the United States. Based on Cowardin, et.al, 1979, some data has been revised based on the latest scientific advances. The USFWS uses these standards as the minimum guidelines for wetlands mapping efforts (FGDC, 2013)

[b] All acreages are rounded to the nearest whole number. The maps are prepared from the analysis of high altitude imagery. A margin of error is inherent in the use of imagery. The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted (USFWS, 2015b)

[c] Intertidal wetlands are wetlands found along a shoreline that are exposed to air at low tide and submerged by water at high tide

Palustrine Wetlands

In New York, palustrine wetlands include the majority of vegetated freshwater wetlands (freshwater marshes, swamps, bogs,[90] and ponds). Common tree types found in palustrine forested wetlands (PFO) in New York are swamp, or red, maples (*Acer rubrum*), cottonwood (*Populus* sp.), and elms (*Ulmus* sp.) (NYSDEC, 2014a). Palustrine scrub-shrub wetlands (PSS) in New York consist of dominant tree species such as alders (*Alnus* sp.), hollies (*Ilex* sp.), and viburnums (*Viburnum* sp.) in the Adirondacks (APA, 2013b), and inkberry highbush blueberries (*Vaccinium corymbosum*), fetterbush (*Lyonia lucida*), and ferns outside of the Adirondack Park (Figure 11.1.5-2) (NYSDEC, 2014a). PFO and PSS are the most common type of palustrine

[89] Saline seep is an area where saline groundwater discharges at the soil surface. These wetland types are characterized by saline soils and salt tolerant plants. (City of Lincoln, 2015)

[90] See Section 11.1.5.4 for a description of bogs.

wetlands within New York. Palustrine emergent wetlands (PEM), or freshwater marsh, fen[91], and slough[92] in New York support diverse plant and animal populations. Common PEM marsh plants in New York include cattails (*Typha latifolia*), bulrushes (*Scirpus* sp.), loosestrifes (*Lythrum salicaria*), and arrowheads (*Sagittaria* sp.) (APA, 2013b).

Palustrine wetlands also include the shallow water zones of lakes, rivers, and ponds and aquatic beds formed by water lilies and other floating-leaved or free-floating plants. These are the easiest wetlands to recognize and occur throughout the state.

[91] See Section 11.1.5.4 for a detailed description of fens.
[92] Slough: "swamp or shallow lake system, usually a backwater to a larger body of water." (NOAA, 2014)

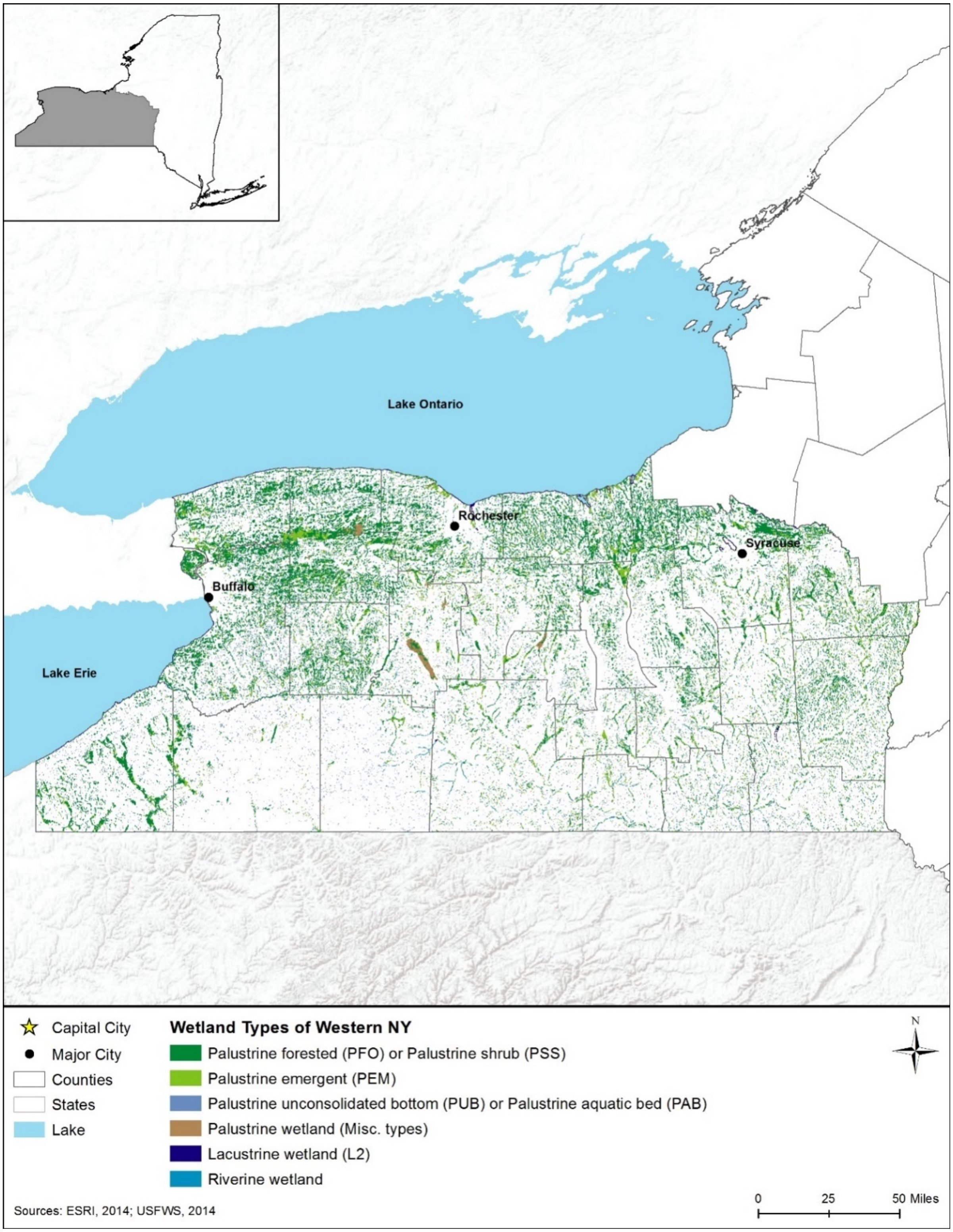


Figure 11.1.5-1: Wetlands by Type, in Western New York, 2014

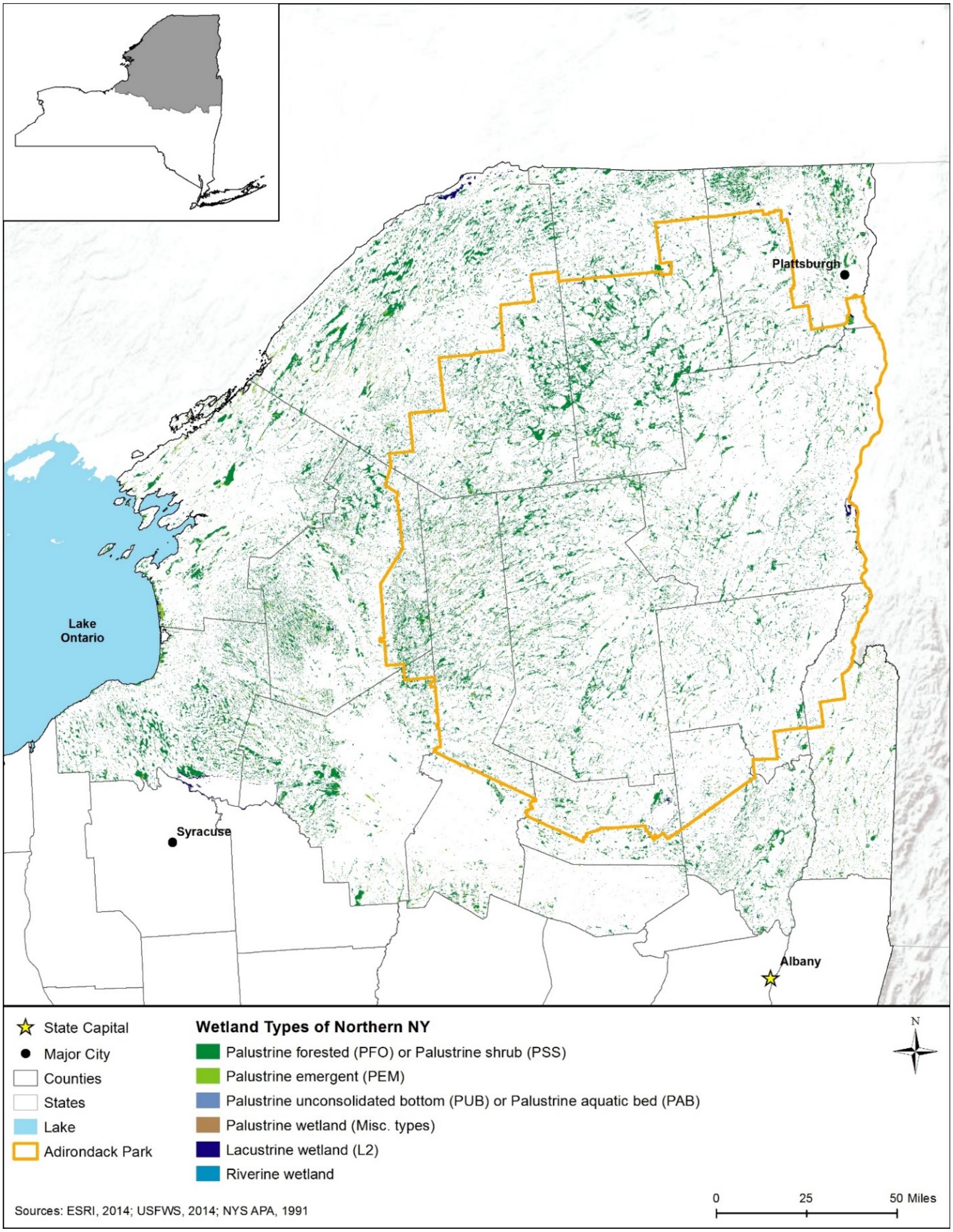


Figure 11.1.5-2: Wetlands by Type, Northern New York, 2014

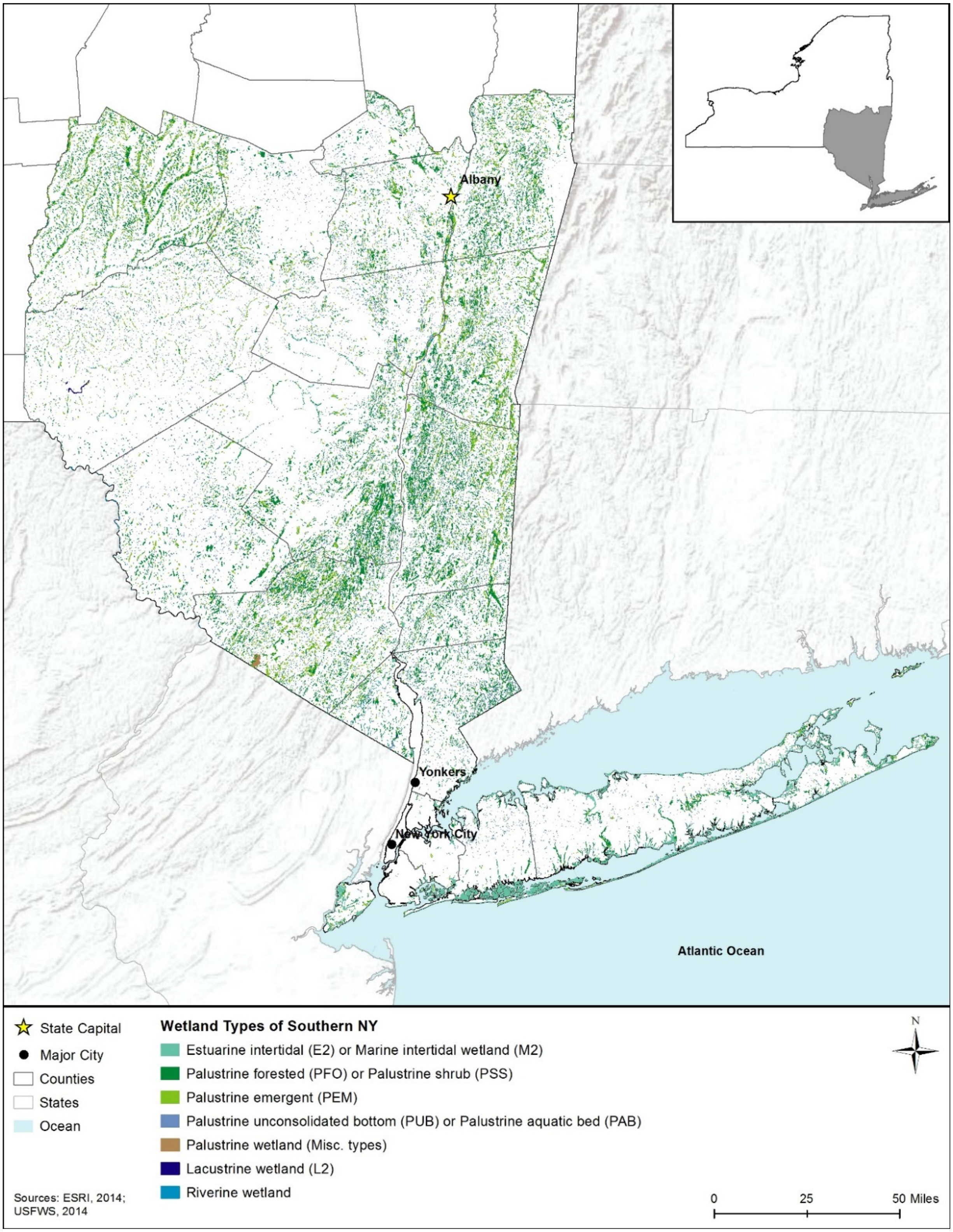


Figure 11.1.5-3: Wetlands by Type, Southern New York, 2014

In the mid-1990s, approximately 2.4 million acres of wetlands existed across New York. The most common palustrine (freshwater) wetland type in the state was PFO/PSS (86 percent), followed by PEM (9 percent), and PUB/PAB (ponds) (5 percent) (NYSDEC, 2015aj). Based on the USFWS NWI 2014 analysis, ratios have remained similar, with PFO/PSS being the dominant wetland type (79 percent), followed by PEM (14 percent), PUB/PAB (ponds) (6 percent), and other palustrine wetlands (1 percent) (USFWS, 2014). Currently, the predominant wetlands in New York are palustrine (freshwater) wetlands with about 2.1 million acres (USFWS, 2014). Main threats to palustrine wetlands in New York include agricultural conversion and urbanization and associated impacts (road construction) (NYSDEC, 2015aj).

In 1975, the New York State Legislature passed the Freshwater Wetlands Act to "preserve, protect, and conserve freshwater wetlands and their benefits, consistent with the general welfare and beneficial economic, social, and agricultural development of the state" (NYSDEC, 2015ak). The Act identifies wetlands based on vegetation type and uses the term 'freshwater' to include all palustrine and open water wetlands. Only freshwater wetlands that are at least 12.4 acres or more in area, or are less than 12.4 acres, but have unusual local importance, or are within the Adirondack Park and meet the definition of wetlands, are mapped and regulated under the Act.

Estuarine and Marine Wetlands

In New York, estuarine, or tidal fringe wetlands, can be vegetated (marshes) or unvegetated (mud and sand flats), and are found between the open saltwater of the bays or Atlantic Ocean and the uplands of the coastal plain and barrier islands. Estuarine wetlands include vegetated mudflats exposed at low tide, such as at Green Island, and salt marshes (tidally flooded grasslands) found in the near shore areas all around Long Island and the lower Hudson River (see Figure 11.1.4-1, in Section 11.1.4, Water Resources).

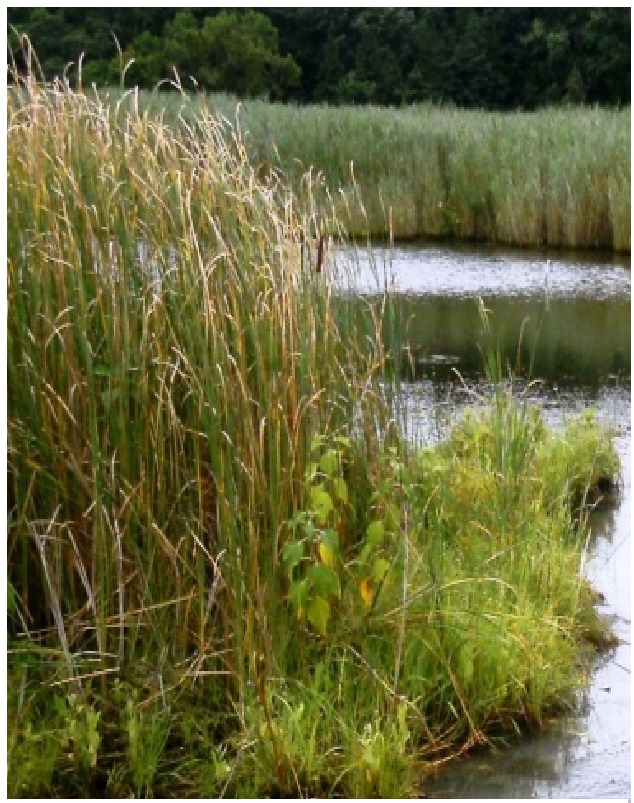


Figure 11.1.5-4: Hudson River NERR Tidal Wetlands

Source: (NOAA, 2015l)

Regulation under New York's Tidal Wetlands Act has proactively protected estuarine wetlands and curbed substantial loss from construction and development in the state. For example, estuarine wetlands have increased over 250 acres in Shinnecock and Moriches Bay. However, losses have occurred in areas such as Jamaica Bay, Queens County, and along the north and south shores of Nassau and Suffolk Counties. In Jamaica Bay, estuarine wetland losses are occurring at an accelerating rate of 44 acres per year, according to

NYSDEC (NYSDEC 2015al). In addition to construction and development, land subsidence, and sea level rise contributes to estuarine wetland loss.

11.1.5.4 Environmental Setting: Wetlands of Special Concern or Value

In addition to protections under the state's Freshwater Wetlands Act, Tidal Wetlands Act, and national CWA, New York considers certain wetland communities as areas of special value due to their global or regional scarcity, "unusual local importance," or habitat they support. These include bogs and fens and wetlands associated with critical resource waters.

Bogs and Fens

In New York, areas classified as a bog or fen are protected under the USACE Nationwide permit due to the scarcity of this habitat in the state and the difficulty with in-kind mitigation. Bogs are acidic wetlands that form thick organic (peat) deposits up to 50 feet deep or more. They have little groundwater influence and are recharged through precipitation. In areas such as the Adirondacks, the stagnant, nutrient-poor, acidic water slows all processes in a bog, including nutrient recycling, making bogs very sensitive to external disturbance (APA, 2013b) (NYSDEC, 2014a).

Fens, unlike bogs, are nutrient-rich, grass- and sedge[93]-dominated emergent wetlands that are recharged from groundwater and have continuous running water. This wet meadow habitat supports distinctive plant communities, including many species that are restricted to New York. Several state-listed rare plants and animals occur in fens, such as handsome sedge (*Carex formosa*, state threatened), marsh valerian (*Valeriana dioica*, state endangered), and bog turtle (*Glyptemys muhlenbergii*, federally threatened, state endangered) (NYSDEC, 2014a).

Wetlands Associated with Critical Resource Waters

Under the USACE Nationwide Permit General Condition #22, New York provides additional protection for wetlands associated with critical resources waters, which includes the Hudson River NERR and the East-of-Hudson portion of the New York City Water Supply.

The Hudson River NERR includes approximately 4,800 acres of palustrine and estuarine wetlands (Figure 11.1.5-4) and uplands at four sites and spans 100 miles of the Hudson River Estuary (see Figure 11.1.4-2 in Water Resources, Section 11.1.4.3). From north to south, the sites are Stockport Flats, Tivoli Bays, Iona Island, and Piermont Marsh. Influenced by the ocean's tides for more than half its length, the Hudson River NERR includes a wide range of wetland habitats, from non-tidal swamps and freshwater wetlands in Stockport Flats, to freshwater tidal mudflats and marshes on Tivoli Bays, and brackish marshes of Piermont to the slightly brackish wetlands of Iona Island (NOAA, 2015b).

The East-of-Hudson watershed of the New York City Water Supply includes portions of Dutchess, Putnam, and Westchester Counties, as shown on Figure 11.1.4-2 in Water Resources, Section 11.1.4.3. The East-of-Hudson portion of the New York City Watershed occupies 387

[93] Sedge: an herbaceous plant with triangular cross-sectional stems and spirally arranged leaves (grasses have alternative leaves) typically associated with wetlands or poor soils.

square miles. Wetlands and deepwater habitats occupy approximately 12 percent of the watershed. Based on NWI mapping in 2004, lacustrine/deepwater habitats represent approximately 15,000 acres, or 6 percent of the watershed, most of which are reservoirs. Palustrine wetlands occupy approximately 15,350 acres, with PFO wetlands as the most abundant wetland type at 71 percent, followed by PUB/PAB (ponds) (14 percent), PSS (7.7 percent), PEM (7.2 percent), and 0.1 percent not identified. From 1968 to 2009, of the East-of-Hudson Watershed lost approximately 192 acres of vegetated wetlands. The greatest loss occurred between 1968 and 1984, when approximately nine acres were lost per year primarily due to residential development (NYCDEP, 2009).

Woodland Pools

Woodland pools are palustrine wetlands that the state has identified as wetlands of special concern. Found primarily in the Hudson River Valley, woodland pools are a type of small, temporary wetland (or vernal pool) present in forested areas, though the pools themselves lack trees. The pools occur in shallow depressions that fill from spring or fall precipitation, and are usually dry by late summer or during droughts since they are not connected to a permanent water source. Woodland pools fill from rain, snowmelt, or groundwater. These small wetlands contribute to storage and filtration of surface water and help recharge aquifers (NYSDEC, 2015am). Vernal pools on Long Island are important breeding habitat for the state endangered tiger salamander (*Ambystoma tigrinum*). Examples of rare plants (state threatened) supported by this type of ecosystem include featherfoil (*Hottonia inflata*) on the coastal plain and Hudson Highlands, and false hop sedge (*Carex lupuliformis*) in the Hudson Valley (NYSDEC, 2014a). Due to their small size (less than 12.4 acres), woodland pools are not protected by state and federal wetland regulations, nor included on state wetland maps, and are often overlooked by state planners.

Other important wetland sites in New York include:

- Wetland Nature Centers are open to the public and all are state-protected because of their ecological importance (NYSDEC, 2015an). More information on the centers is available at www.dec.ny.gov/lands/5140.html.
- Wildlife Management Areas are designated for outdoor recreation; these public lands include more than 53,000 acres of wetlands (NYSDEC, 2015ao). To learn more about state Wildlife Management Areas, visit www.dec.ny.gov/outoor/7768.html.
- National Natural Landmarks range in size from 10 acres to over 3,000 acres, and are owned by NYSDEC, The Nature Conservancy, universities, counties, municipalities, and other conservation organizations and individuals (NPS, 2015c). Section 11.1.8, Visual Resources, describes New York's National Natural Landmarks.
- Other wetlands protected under easements or agreements through voluntary government programs and resource conservation groups include the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) Agricultural Conservation Easement Program, Farm Service Agency Conservation Reserve Program, and easements managed by natural resource conservation groups (state land trusts) (NYSDEC, 2015ak). According to the National Conservation Easement Database, a national electronic repository of

government and privately held conservation easements (http://conservationeasement.us/), NRCS holds more than 50,000 acres in conservation easements in New York (National Conservation Easement Database, 2015).

11.1.6 Biological Resources

11.1.6.1 Definition of the Resource

This chapter describes the biological resources of New York. Biological resources include terrestrial[94] vegetation, wildlife, fisheries, and aquatic habitats[95], threatened[96] and endangered[97] species as well as communities and species of conservation concern. Wildlife habitat and associated biological ecosystems are also important components of biological resources. Because of the significant topographic variation within the state, glaciation advances, and its location along the Atlantic Coast, New York supports a wide diversity[98] of biological resources ranging from marine[99] settings along Long Island in the southeastern portion of the State, to northern coniferous[100] forests in the montane regions of the north. Each of these topics is discussed in more detail below.

11.1.6.2 Specific Regulatory Considerations

The pertinent federal laws relevant to the protection and management of biological resources in New York are summarized in Appendix A, Environmental Laws and Regulations. Table 11.1.6-1 summarizes the state laws relevant to the state's biological resources and the project.

[94] Terrestrial: "Pertaining to the land." (USEPA, 2015f)
[95] Habitat: "The environment in which an organism or population of plants or animals lives; the normal kind of location inhabited by a plant or animal." (USEPA, 2015f)
[96] Threatened species are "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." (16 U.S.C §1532(20)) (USEPA, 2015f).
[97] Endangered species are "any species which is in danger of extinction throughout all or a significant portion of its range." (16 U.S.C §1532(6)) (USEPA, 2015f).
[98] Diversity: "An ecological measure of the variety of organisms present in a habitat." (USEPA, 2015f).
[99] Marine: "Any marine environment, from pond to ocean, in which plants and animals interact with the chemical and physical features of the environment." (USEPA, 2015f)
[100] Coniferous: "Cone-bearing trees, mostly evergreens that have needle-shaped or scale-like leaves. They produce wood known commercially as softwood." (USEPA, 2015f)

Table 11.1.6-1: Relevant New York Biological Resources Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
NYCRR Part 575	NYSDEC	Provides a list of all prohibited and regulated invasive[101] species for New York.
New York Environmental Conservation Law	NYSDEC	Protection of threatened and endangered species in New York. Currently, the NYSDEC lists: 11 mammals, 20 birds, 7 reptiles, 2 amphibians, 19 fish, 24 invertebrates, and 504 plants.

11.1.6.3 Terrestrial Vegetation

There are tens of thousands of plant species considered by the NYSDEC to be part of the flora of New York (NYSDEC, 2015ap). The distribution of vegetation (i.e., flora[102]) within the state is a function of the geology[103], soils, climate, and water of a given geographic area and correlates to distinct areas identified as ecoregions[104]. Ecoregions are broadly defined areas that share similar characteristics, such as climate, geology, soils, and other environmental conditions, and represent ecosystems contained within a region. Ecoregion boundaries are not fixed, but rather depict a general area with similar ecosystem types, functions, and qualities. (National Wildlife Federation, 2015) (USDA, 2015a) (World Wildlife Fund, 2015)

Ecoregion boundaries often coincide with physiographic[105] regions of a state. The ecoregions mapped by the USEPA are the most commonly referenced, although individual states and organizations have defined ecoregions that may differ slightly. The USEPA Level I ecoregion is the coarsest level, dividing the U.S. into 15 ecological regions. Level II further divides the country into 50 regions. The continental US contains Level III ecoregions and the contiguous lower 48 states has 84 Level III ecoregions. This section presents a discussion of biological resources for New York at USEPA Level III (Bryce, et al., 2010).

As shown in Figure 11.1.6-1: USEPA Level III Ecoregions in New York, the USEPA divides New York into nine Level III ecoregions, each supporting a variety of different plant communities, all predicated on their general location within the state. Communities range from coniferous and hardwood communities in the northern mountains, to hardwood communities in the southern portions of the state. Areas adjacent to the Great Lakes and the coastal regions of Long Island are influenced by the sub-climates found at these locations. Table 11.1.6-2 provides a summary of the general abiotic[106] characteristics, vegetative communities, and the typical vegetation found within each of the nine New York ecoregions.

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[101] Invasive: "These are species that are imported from their original ecosystem. They can out-compete native species as the invaders often do not have predators or other factors to keep them in check." (USEPA, 2015f))

[102] Vegetation within an area.

[103] USGS defines geology as an interdisciplinary science with a focus on the following aspects of earth sciences: geologic hazards and disasters, climate variability and change, energy and mineral resources, ecosystem and human health, and ground-water availability.

[104] Ecoregion: "A relatively homogeneous ecological area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables." (USEPA, 2015f)

[105] Physiographic: "The natural, physical form of the landscape." (USEPA, 2015f)

[106] Abiotic: "Nonliving characteristic of the environment; the physical and chemical components that relate to the state of ecological resources." (USEPA, 2015f)

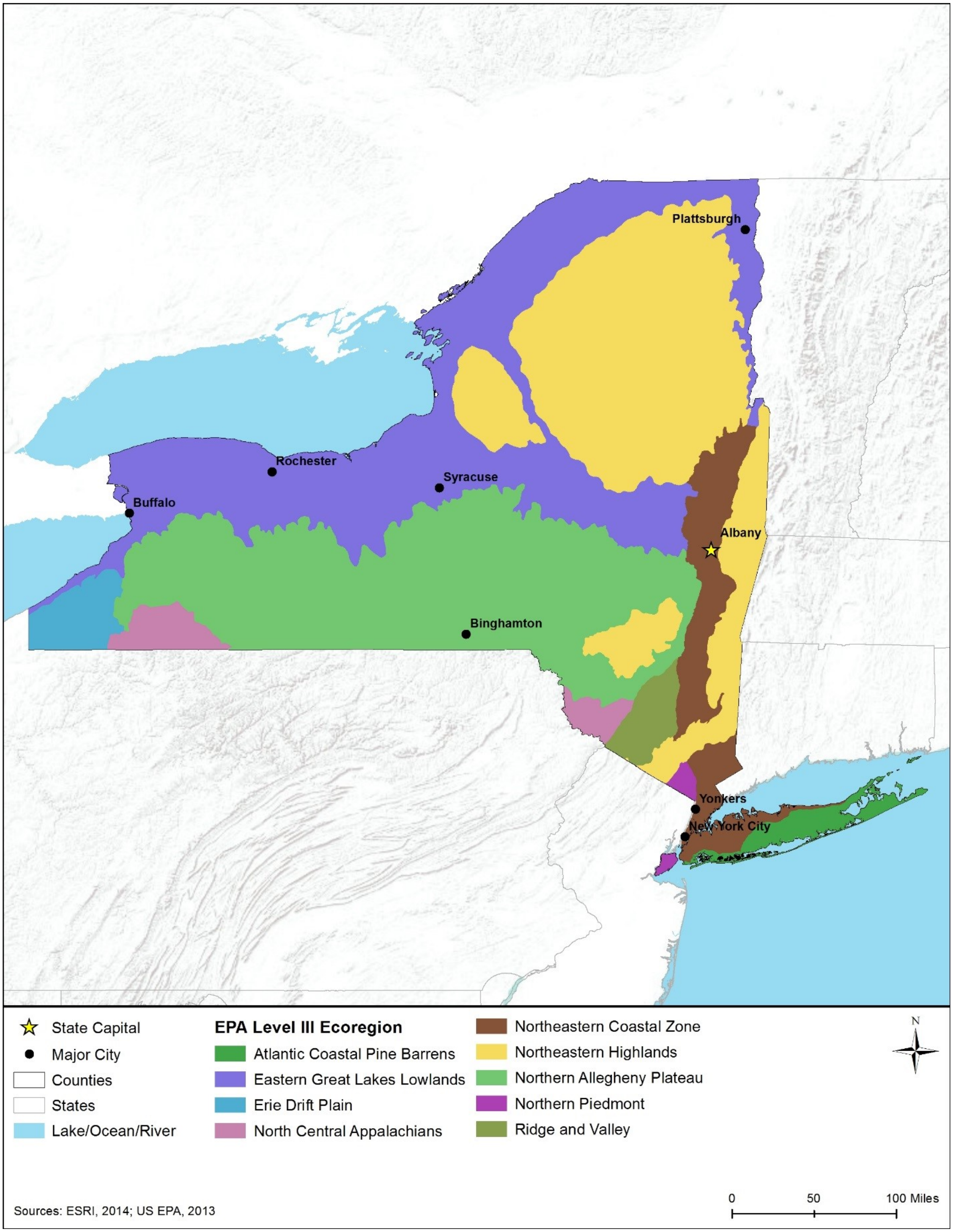

Figure 11.1.6-1: USEPA Level III Ecoregions in New York

Table 11.1.6-2: Characteristics of Level III Ecoregions in New York

Ecoregion Number	Ecoregion Description	Abiotic Characterization	General Vegetative Communities	Typical Vegetation
Geographic Region: Great Lakes				
61	Erie Drift Plain	Largely agricultural but historically forested; composed of hills, glaciated and unglaciated landscapes, wetlands[107], and human urban and industrial development	Historically Maple-Beech-Birch Forest, but now mostly agricultural	• **Hardwood Trees** – American beech (*Fagus grandifolia*); Maples (*Acer* spp.); Basswood (*Tilia americana*); American elm (*Ulmus americana*); Ironwood (*Ostrya virginiana*) • **Shrubs** – Spicebush (*Lindera benzoin*)
83	Eastern Great Lakes Lowlands	Composed of glaciated irregular plains bordered by hills, exhibiting more agricultural activity relative to adjacent ecoregions	Beech-Maple; Pine-Oak-Heath Sandplain Forest; White Pine-Red Oak-Black Oak	• **Hardwood Trees –** American beech; Maples; Oaks (*Quercus* spp.); Basswood; American elm; White ash (*Fraxinus americana*) • **Conifer Trees –** White pine (*Pinus strobus*)
Geographic Region: Finger Lakes & Catskills				
60	Northern Allegheny Plateau	Composed of till-covered rolling hills, open valleys, and low mountains that are a mix of agricultural land and woodland	Appalachian Oak Forest and Northern Hardwood Forest	• **Hardwood Trees –** Maples; Oaks; American beech; Birches (*Betula* spp.); Basswood; Hickories (*Carya* spp.); Eastern hemlock (*Tsuga canadensis*); Cherries (*Prunus* spp.)
62	North Central Appalachians	Forested plateaus[108], high hills, and low mountains, largely unaffected by glaciation	Appalachian Oak Forest; Maple-Beech-Birch	• **Hardwood Trees –** Maples; Oaks; American beech; Birches; Hickories; Eastern hemlock; Cherries • **Shrubs –** Eastern dogwood (*Cornus florida*)

[107] Wetland communities are described in Section 11.1.5.
[108] Plateau: "An elevated plain, tableland or flat-topped region of considerable extent." (USEPA, 2015d)

Ecoregion Number	Ecoregion Description	Abiotic Characterization	General Vegetative Communities	Typical Vegetation
Geographic Region: Hudson River Valley				
58	Northeastern Highlands	Composed mostly of forested hills and mountains on nutrient poor soils, with numerous high-gradient streams and glacial[109] lakes	Maple-Beech-Birch; Spruce-Fir; Oak-Hickory	• **Hardwood Trees** – Maples; Oaks; Bitternut hickory (*Carya cordiformis*); American beech; Birches; White walnut (*Juglans cinerea*); Spruces (*Picea* spp.); Eastern hemlock (*Tsuga canadensis*) • **Conifer Trees –** Balsam fir (*Abies balsamea*); White pine (*Pinus strobus*) • **Shrubs –** Highbush blueberry (*Vaccinium corymbosum*); Mountain laurel (*Kalmia latifolia*)
59	Northeastern Coastal Zone	Composed of irregular plains and plains with high hills, on nutrient poor soils with numerous glacial lakes	Appalachian Oak Forest and Northeastern Oak-Pine Forest	• **Hardwood Trees** – Oaks; Sweetgum (*Liquidambar styraciflua*); Persimmon (*Diospyros virginiana*); Red maple; Black birch (*Betula lenta*); American chestnut (*Castanea dentate*); Hickories • **Conifer Trees –** White pine (*Pinus strobus*); Pitch pine (*Pinus rigida*) • **Shrubs** – American holly (*Ilex opaca*); Eastern dogwood
64	Northern Piedmont	Transitional region composed of low hills, irregular plains, and open valleys in contrast to low mountains to the north and west and flatter coastal plains to the east	Mixed Hardwoods	• **Hardwood Trees -** Oaks; Maples; Black birch (*Betula lenta*) • **Shrubs -** Tulip tree (Liriodendron tulipifera)

[109] Glacial: “Of or pertaining to distinctive processes and features produced by or derived from glaciers and ice sheets.” (USEPA, 2015e)

Ecoregion Number	Ecoregion Description	Abiotic Characterization	General Vegetative Communities	Typical Vegetation
67	Ridge and Valley	Diverse region composed of ridges and valleys with a variety of widths, heights, and geologic[110] composition, with numerous springs and caves	Mixed Oak-Sugar Maple-Northern Hardwood	• **Hardwood Trees –** Oaks; Sugar maple (*Acer saccharum*); Birches; American basswood; Hickories
Geographic Region: Adirondacks				
58	Northeastern Highlands	Composed mostly of forested hills and mountains on nutrient poor soils, with numerous high-gradient streams and glacial lakes	Maple-Beech-Birch; Spruce-Fir; Oak-Hickory	• **Hardwood Trees** – Maples; Oaks; Bitternut hickory; American beech; Birches; White walnut; Spruces; Eastern hemlock • **Conifer Trees** – Balsam fir; White pine • **Shrubs** – Highbush blueberry; Mountain laurel
Geographic Region: Long Island				
59	Northeastern Coastal Zone	Composed of irregular plains and plains with high hills, on nutrient poor soils with numerous glacial lakes	Appalachian Oak Forest and Northeastern Oak-Pine Forest	• **Hardwood Trees** – Oaks; Sweetgum; Persimmon; Red maple; Black birch; American chestnut; Hickories • **Conifer Trees –** White pine; Pitch pine • **Shrubs** – American holly; Eastern dogwood
84	Atlantic Coastal Pine Barrens	Transitional ecoregion, distinguished from the adjacent coastal ecoregion to the south by its coarser-grained soils, cooler climate, and oak-pine vegetation	Dwarf Pine; Pitch Pine-Oak; Coastal Shrub	• **Hardwood Trees** – Oaks; Black gum (*Nyssa sylvatica*); Eastern red cedar (*Juniperus virginiana*) • **Conifer Trees** – Pitch pine • **Shrubs –** Northern bayberry (Myrica pensylvanica); Mountain laurel; Sassafras (*Sassafras* spp.)

Sources: (USEPA, 2013a) (Bryce, et al., 2010) (Elias, 1989) (Petrides, 1986)

[110] Geologic: "Referring to the history and structure of the solid portion (rocks, soils, and minerals) of the earth." (USEPA, 2015f)

Communities of Concern

New York contains several vegetative communities of concern that include rare natural plant communities, plant communities with greater vulnerability or sensitivity to disturbance, and communities that provide habitat for both rare plant and wildlife species. The New York Natural Heritage statewide inventory includes lists of all types of natural communities known to occur, or that have historically occurred, in the state. The historical occurrences are important for assessing previously undocumented occurrences or re-occurrences of previously documented species. Each natural community is assigned a rank based on its rarity and vulnerability. The ranking system for these communities gives an indication of the relative rarity, sensitivity, uniqueness, or vulnerability of these areas to potential disturbances. This ranking system also gives an indication of the level of potential impact to a particular community[111] that could result from implementation of an action.

The New York Natural Heritage Program statewide inventory includes lists of all types of natural communities known to occur, or that have historically occurred, in the state. Historical occurrences are important for assessing previously undocumented occurrences or re-occurrences of previously documented species. Each natural community is assigned a rank based on its rarity and vulnerability. As with most state heritage programs, the New York Natural Heritage Program ranking system assesses rarity using a state rank (S1, S2, S3, S4, S5) that indicates its rarity within New York. Communities ranked as an S1 by the New York Natural Heritage Program are of the greatest concern. This rank is typically based on the range of the community, the number of occurrences, the viability of the occurrences, recent trends, and the vulnerability of the community. As new surveys and studies continue to provide additional data these ranks are revised as necessary to reflect the current state of the community (NYSDEC, 2014a).

There are 24 vegetative communities that are ranked as S1 communities[112] in New York; these communities represent the rarest terrestrial habitat in the state and comprise a small area of New York's total land area. In New York, the S1-ranked communities occur in the eastern half of the state, with the majority being rare coastal communities on Long Island, in the Coastal Lowlands subzone of the Coastal Lowlands Ecozone. However, some of these communities also occur within the Finger Lakes and Catskills and even as far east as the Great Lakes region (NYSDEC, 2014a). New York Appendix B, Table B-1 summarizes the rarest terrestrial plant communities found in New York, defined as those with a state rank of S1.

Nuisance and Invasive Plants

Nuisance and invasive plants is a broad category that includes a large number of undesirable plant species that are non-native to areas and have the potential to spread causing harm to the

[111] Community: "In ecology, an assemblage of populations of different species within a specified location in space and time. Sometimes, a particular subgrouping may be specified, such as the fish community in a lake or the soil arthropod community in a forest." (USEPA, 2015g)

[112] S1 – Communities "at high risk because of extremely limited and/or rapidly declining population numbers, range and/or habitat, making it highly vulnerable to global extinction or extirpation in the state." (MNHP and MFWP, 2015)

environment, local economy, and human health. Noxious weeds[113] are typically non-native species that have been introduced into an ecosystem inadvertently; however, on occasion native species can be considered a noxious weed. Noxious weeds greatly affect agricultural areas, forest management, natural, and other open areas (U.S. Legal, 2015). New York does not maintain a noxious weeds list or regulate noxious weeds at the state level; however, the U.S. government has designated certain plant species as noxious weeds in accordance with the Plant Protection Act of 2000 (7 U.S.C. 7701 et seq.). As of September 2014, 112 federally recognized noxious weed species have been catalogued in the United States (88 terrestrial, 19 aquatic, and 5 parasitic) (USDA, 2015b). According to the U.S. Department of Agriculture (USDA) PLANTS database (USDA, 2015b) at least six of these noxious weed species are known to occur within New York including three terrestrial, one aquatic, and two parasitic species.

While the state does not regulate noxious weeds, in July 2014, New York adopted regulations that prohibit[114] or regulate[115] the possession, transport, importation, sale, purchase, and introduction of select invasive species, both plants and animals (6 NYCRR Part 575). The regulation became effective on March 10, 2015, with one plant species, Japanese barberry (*Berberis thunbergii*), having a one-year grace period during which prohibition or regulation would not be enforced in order for existing stock of Japanese barberry to be sold (NYSDEC, 2014b). Of the 74 plant species identified, 62 are classified as terrestrial or wetlands and 12 are classified as aquatic species (6 NYCRR Part 575).

11.1.6.4 Terrestrial Wildlife

This section discusses the terrestrial wildlife species in New York, divided among mammals, birds, reptiles and amphibians, and invertebrates. Terrestrial wildlife are those species of animals, and their habitats, that live predominantly on land. Terrestrial wildlife include common big game species, small game animals and furbearers, nongame animals, and game birds and waterfowl, and their habitats that may be found in New York. A discussion of non-native or invasive wildlife species is also included. There are 61 mammal species considered by the NYSDEC to be part of the fauna[116] of New York (NYSDEC, 2005b) (NYSDEC, 2010), 455 (Smith & Richmond, 2002) to 465 (NYSOA, 2014) species of resident and migratory birds documented in the state, 71 reptile and amphibian species (NYSDEC, 2010), and innumerable invertebrates.

[113] Noxious weeds: “any living stage (e.g., seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health.” (Federal Noxious Weed Act, 1975)

[114] Species that cannot be knowingly possessed with the intent to sell, import, purchase, transport or introduce are classified as prohibited. (NYSDEC, 2014b).

[115] Species that are legal to possess, sell, buy, propagate and transport, but cannot be knowingly introduced into a free-living state are regulated. (NYSDEC, 2014b).

[116] Animals within an area.

Mammals

Of the 61 mammal species present in New York, many are common or widely distributed throughout the state. Table 11.1.6-3 presents a breakdown of mammals by taxonomic order. Mammal species commonly found throughout New York include the gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). Most mammals are widely distributed in the state; however, there are some species, such as the American marten (*Martes americana*) and least shrew (*Cryptotis parva*), are found primarily in the northern (e.g., Adirondacks) or southern portions (e.g., Hudson River Valley or Long Island) of the state, respectively (NYSDEC, 2015aq) (NYSDEC, 2015c) According to the New York Natural Heritage database, mammals are concentrated within the Adirondacks as well as the habitats along the Hudson River and the Susquehanna watershed[117]. Approximately 60 percent of the mammal species in New York are protected either as a state game species or as a federal and/or state listed endangered or threatened species (NYSDEC, 2005b). Section 11.1.6.6, Threatened and Endangered Species, identifies these protected species.

White-tailed deer and black bear (*Ursus americanus*) are classified as big game species, whereas small game species include small mammals (e.g., squirrels and rabbits), furbearers,[118] upland and migratory game birds, reptiles, and amphibians (NYSDEC, 2015ar) (NYSDEC, 2015as) (NYSDEC, 2010). White-tailed deer occur throughout the state, whereas black bears are found primarily in the Adirondack region, with smaller populations present in the Catskills and central-western region of the state. However, established populations of black bears occur in Tug Hill and the Hudson Valley, with transient bears observed in Mohawk Valley, Lake Ontario Plains, and the St. Lawrence Valley (NYSDEC, 2015as). The following 10 species of furbearers may be legally hunted in the state: coyote (*Canis latrans*), bobcat (*Lynx rufus*), raccoon, red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), opossum, skunk, weasel (*Mustela* spp.), American mink (*Neovison vison*), and muskrat (*Ondatra zibethicus*) (NYSDEC, 2015at).

New York has identified 22 mammals as Species of Greatest Conservation Need (SGCN). The SGCN list consists of at-risk species that are rare or declining; State Wildlife Grants provide funds for efforts to reduce at-risk species with the potential for listing as endangered. Although these species have been targeted for conservation they are not currently under legal protection. The SGCN list is updated periodically and used by the state to focus their conservation efforts and to implement their State Wildlife Action Plan (SWAP) (NYSDEC, 2015au).

[117] Watershed: "The land area that catches rain or snow and drains it into a local waterbody (such as a river, stream, lake, marsh, or aquifer) and affects its flow, and the local water level." (USEPA, 2015f)
[118] A furbearer species is any animal whose fur is considered commercially valued or of a high quality.

Table 11.1.6-3: Mammal Species in New York

General Description/Examples	Number of Species
Marsupials (opossum)	1
Shrews and moles	10
Bats	9
Canids (coyote and foxes)	3
Bear	1
Skunk	1
Raccoon	1
Mustelids (ermine, minks, weasels, and otters)	6
Felids (bobcat)	1
Marine mammals (seals, dolphins, and whales)*	20
Ungulates (deer and moose)	2
Rodents (chipmunks, squirrels, and voles)	23
Rabbits and hares	3

Source: (NYSDEC, 2010)
Note: *Marine mammals are described in further detail in Section 11.1.6.5, Fisheries and Aquatic habitats.

The house mouse (*Mus musculus*) and Norway rat (*Rattus norvegicus*) are both examples of mammal species that were introduced to New York. Exotic[119] (non-native) mammals do not currently pose many conservation issues within the state. However, some native mammals, such as the striped skunk (*Mephitis mephitis*) and raccoon, have adapted well to developed and human dominated urban and suburban environments. The populations of these species have increased dramatically and have grown to nuisance levels (NYSDEC, 2005b).

Birds

The number of native bird species documented in New York varies according to the timing of the data collection effort, changes in bird taxonomy[120], and the reporting organization's method for categorizing occurrence and determining native versus non-native status. This section begins with a summary of native bird species found in New York. Although the numbers differ slightly, the taxonomic richness of the state is evident. The variety of ecological communities (i.e., coastal areas, mountains, large rivers and lakes, plains, etc.) in New York in turn supports a large variety of bird species.

As of 1999, 455 species of resident and migratory birds had been documented in New York (Smith & Richmond, 2002), representing 19 orders and 62 families, with 244 of those species known as breeding birds (NYSDEC, 2015av) (NYSDEC, 2015am). Among the 455 extant[121] species in New York, 118 species (26.3 percent) were of sufficient rarity to merit submission of written documentation of their occurrences to the New York State Avian Records Committee (NYSARC). In addition to the NYSARC list, the Breeding Bird Atlas is a comprehensive, statewide survey that documents the distribution of breeding birds in New York. Two Breeding Bird Atlas projects have been completed to date: the first from 1980 to 1985, and the second

[119] Exotic: "A non-native plant or animal introduced from another geographic area." (USEPA, 2015h)
[120] Taxonomy: "A formal representation of relationships between items in a hierarchical structure." (USEPA, 2015i)
[121] Extant: "A species that is currently in existence (the opposite of extinct)." (USEPA, 2015j)

from 2000 to 2005 (NYSDEC, 2015av), with the most recent atlas released in December 2008 (NYSDEC, 2015am).

In 2015, the New York State Ornithological Association reported 465 species of resident and migratory birds in New York (NYSOA, 2014). Table 11.1.6-4 presents a breakdown of these numbers by taxonomic order.

Table 11.1.6-4: Native Bird Species in New York

Order	General Description/Examples	Number of Species
Accipitriformes	Vultures, osprey, kites, eagles, hawks	17
Anseriformes	Geese, swans, ducks	44
Apodiformes	Swifts and hummingbirds	6
Caprimulgiformes	Nightjars	3
Charadriiformes	Plovers, sandpipers, gulls, terns	101
Ciconiiformes	Storks	1
Columbiformes	Pigeons, doves	5
Coraciiformes	Kingfishers	1
Cuculiformes	Cuckoos	2
Falconiformes	Caracaras, falcons	4
Galliformes	Ground-feeding birds	4
Gaviiformes	Loons	4
Gruiformes	Rails, gallinules, moorhens, coots, cranes	12
Passeriformes	Passerines	192
Pelecaniformes	Pelicans, bitterns, herons, night-herons, ibises, spoonbills	19
Phaethontiformes	Tropicbirds	2
Piciformes	Woodpeckers, sapsuckers, flickers	11
Podicipediformes	Grebes	5
Procellariiformes	Albatrosses, petrels, shearwaters	14
Strigiformes	Owls	12
Suliformes	Frigatebirds, boobies, gannets, cormorants	6

Source: (NYSOA, 2014)

Three threatened and endangered birds are located in New York. Section 11.1.6.6, Threatened and Endangered Species, lists and briefly describes these protected species.

New York is located within the Atlantic Flyway, which spans more than 3,000 miles from the Arctic tundra to the Caribbean. It is the most densely human-populated of the four waterfowl migration flyways in North America (Atlantic, Mississippi, Central, and Pacific) (Ducks Unlimited, 2015). Large numbers of waterfowl and non-waterfowl birds utilize this flyway and other migration corridors and pathways throughout the state during their annual migrations northward in the spring and southward in the fall. Despite the dense human population and development, the coastal areas of New York City and Long Island are an important ecological resource for migrating birds (National Audubon Society, Inc., 2015a). Montezuma NWR in western New York is a well-known migratory stopover area for birds (USFWS, 2012a). The Catskill and Adirondack Mountain regions as well as the Finger Lakes region and the Hudson River Valley region are also important stopover areas for migratory birds.

A total of 136 Important Bird Areas (IBA) have been identified in New York as important locations for birds requiring land conservation (Audubon New York, 2016). IBAs assist in achieving local conservation priorities to provide important habitat for native bird populations during breeding[122], migratory stops, feeding, and over-wintering areas. A variety of habitats are designated as IBAs (see Figure 11.1.6-2), including forests, scrub/shrub, grasslands, freshwater and saltwater wetlands, and bodies of water (National Audubon Society, Inc., 2015b). New York's IBAs are widely distributed throughout the state with clusters of IBAs around the northern Adirondacks, the Hudson River Valley, the Finger Lakes region, the Catskills, and in Long Island (National Audubon Society, Inc., 2015b).

Modeled after the IBA program, the New York Bird Conservation Area (BCA) Program aims to protect bird populations and habitats during agency conservation initiatives. Designated BCAs are important habitats for large numbers of bird species (i.e., waterfowl, pelagic[123] seabirds, shorebirds, wading birds, and migratory birds); offer high species diversity[124]; protect at risk species; or serve as a bird research site. To date, New York has 59 designated BCA sites, of which 25 are associated or collocated with New York state parks (NYSDEC, 2015av) (New York Office of Parks, Recreation, and Historic Preservation, 2015a).

[122] Breeding areas: "The area utilized by an organism during the reproductive phase of its lifecycle and during the time that young are reared." (USEPA, 2015k)
[123] Pelagic seabirds are birds that swim over open water.
[124] Species diversity: "The variety of species in an area. It includes not only the number of species in the area but also their relative abundance and spatial distribution." (USEPA, 2015l)

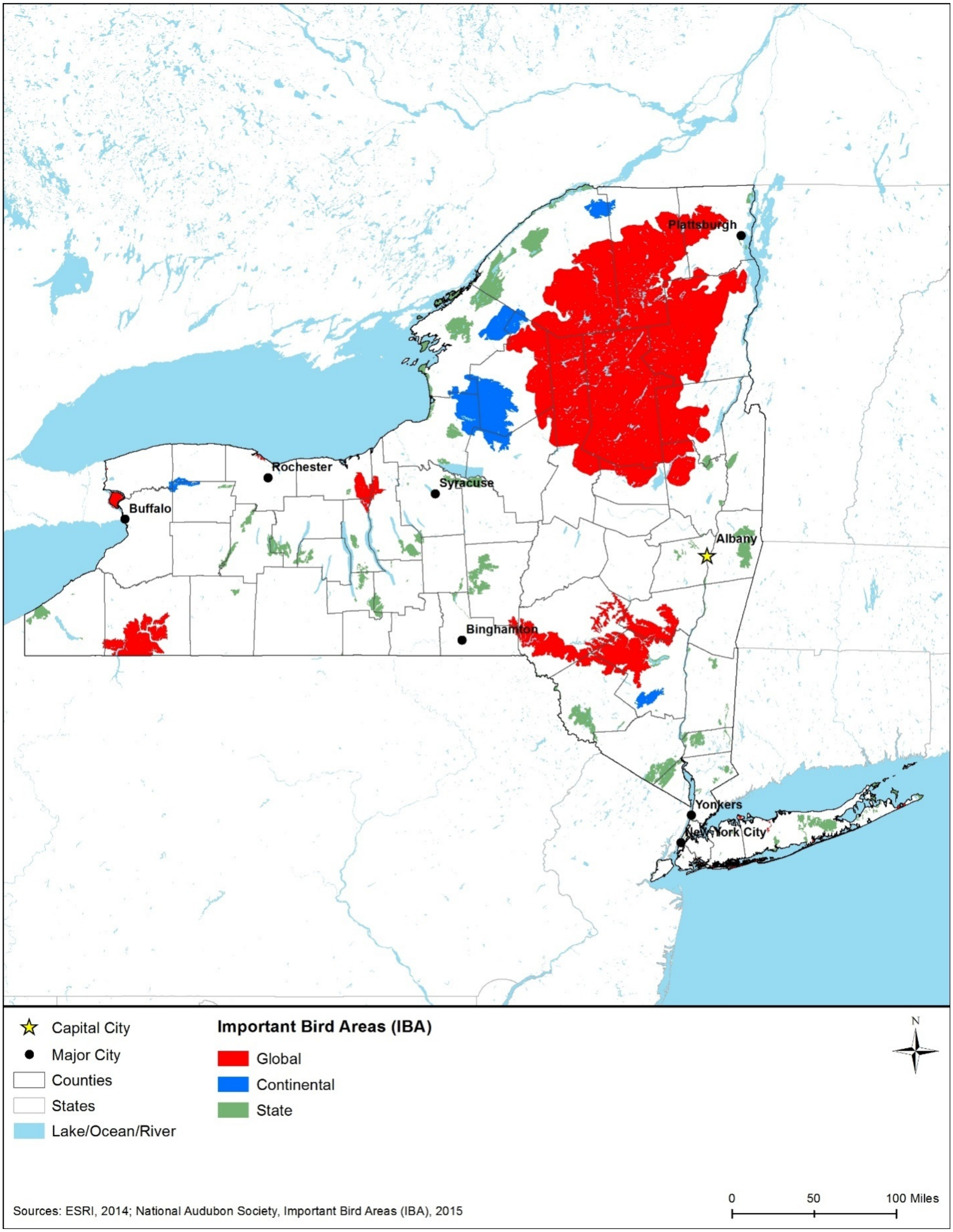

Figure 11.1.6-2: New York Important Bird Areas

Reptiles and Amphibians

A total of 71 native reptile and amphibian species occur in New York, including 18 species of salamanders, 15 frogs and toads, 17 turtles, 4 lizards, and 17 snakes (NYSDEC, 2010). These species occur in a wide variety of habitats from the Adirondack Mountains and the Finger Lakes to Long Island's ocean waters, as well as in cities and suburbs.

Reptile and amphibian species are widely distributed throughout New York and are a representative mix of species that are also found in more southern, central, and northern regions. For example, New York is "the northern limit of the hellbender (*Cryptobranchus alleganiensis*), marbled salamander (*Ambystoma opacum*), tiger salamander (*Ambystoma tigrinum*), red salamander (*Pseudotriton ruber*), long-tailed salamander (*Eurycea longicauda*), Wehrle's salamander (*Plethodon wehrlei*), eastern spadefoot (*Scaphiopus holbrookii*), northern cricket frog (*Acris crepitans*), southern leopard frog (*Lithobates sphenocephalus*), eastern mud turtle (*Kinosternon subrubrum*), bog turtle (*Clemmys muhlenbergii*), eastern fence lizard (*Sceloporus undulates*), and copperhead (*Agkistrodon contortrix*). It is also the eastern extreme for the tiger salamander, Eastern massasauga rattlesnake (*Sistrurus catenatus*), queen snake (*Regina septemvittata*), and western chorus frog (*Pseudacris triseriata*). The mink frog (*Rana septentrionalis*) reaches its southern range limit in New York. These species are complemented by a large number of species that are widely distributed across the entire state. These include the spotted salamander (*Ambystoma maculatum*), eastern red-backed salamander (*Plethodon cinereus*), northern two-lined salamander (*Eurycea bislineata*), eastern newt (*Notophthalmus viridescens*), bullfrog (*Rana catesbeiana*), spring peeper (*Pseudacris crucifer*), green frog (*Rana clamitans*), wood frog (*Rana sylvatica*), pickerel frog (*Rana palustris*), common snapping turtle (*Chelydra serpentine*), painted turtle (*Chrysemys picta*), and the common garter snake (*Thamnophis sirtalis*). Other widespread species include the northern water snake (*Nerodia sipedon*), eastern milk snake (*Lampropeltis triangulum*) (missing from parts of northern New York), and the American toad (*Anaxyrus americanus*) (absent from Long Island)" (Gibbs, et al., 2007).

In 2006, New York adopted legislation that gave all life forms (including eggs and larvate) of native reptiles and amphibians legal protection as game species, with very few open to harvest (i.e., collecting, gathering, or hunting in the field). This law does not differentiate between wild-caught and captive-bred animals or animals possessed prior to the enactment of the law. The only turtle species with an open hunting season are the snapping turtle and diamondback terrapin. In addition, a hunting season for some frog species exists in the summer months. These species include eastern spadefoot toads (*Leptobrachium* spp.), eastern American toad (*Anaxyrus americanus*), Fowler's toad (*Anaxyrus fowleri*), northern cricket frog (*Acris crepitans*), northern gray treefrog (*Hyla versicolor*), northern spring peeper (*Pseudacris crucifer*), western chorus frog (*Pseudacris triseriata*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), mink frog (*Rana septentrionalis*), wood frog (*Rana sylvatica*), northern leopard frog (*Lithobates pipiens*), southern leopard frog (*Lithobates sphenocephalus*), and pickerel frog (*Lithobates palustris*) (NYSDEC, 2010).

Four threatened and endangered reptiles are located in New York. Section 11.1.6.6, Threatened and Endangered Species, lists and briefly describes these protected species.

Invertebrates

New York is home to a large number of invertebrate species, including bees, hornets, wasps, butterflies, moths, beetles, flies, dragonflies, damselflies, spiders, mites, crustaceans, and nematodes. These invertebrates provide an abundant food source for mammals, birds, reptiles, amphibians, and other invertebrates.

A total of 450 bee species occur in New York, with more than 225 bee species recorded in New York City (American Museum of Natural History, 2014). New York is home to 10 families and 190 species of dragonflies and damselflies, but little is known about the status or habitat requirements for many of these species. Similarly, little is known about the more than 30 stonefly and over 150 mayfly species in the state. The number of beetle species in New York is unknown. There are approximately 500 species of butterflies and moths in the state with some of the more common species being the black swallowtail (*Papilio polyxenes*), orange sulphur (*Colias eurytheme*), and cabbage white (*Pieris rapae*) (NYSDEC, 2005b).

Five threatened and endangered invertebrates are located in New York. Section 11.1.6.6, Threatened and Endangered Species, identifies these protected species.

Invasive Wildlife Species

As mentioned earlier, New York has adopted regulations that prohibit or regulate select plant and wildlife invasive species (6 NYCRR Part 575). There are four bird and 13 terrestrial invertebrate species that are either prohibited or regulated in New York. These species are listed in 6 NYCRR Part 575. The NYSDEC has also identified several nuisance bird species, such as nuisance gulls and the Canada goose (*Branta canadensis*). The prohibited and regulated terrestrial invertebrate species include pests that cause damage to native vegetation, among others.

11.1.6.5 Fisheries and Aquatic Habitat

This section discusses the aquatic wildlife species in New York, including fish, invertebrates, marine mammals, and sea turtles. A summary of non-native and invasive aquatic species is also presented in this section. Fish are divided into freshwater and saltwater species, although many of New York’s fish are diadromous (i.e., anadromous[125] and catadromous[126]), reflecting the state’s location along the Atlantic coast and the variety of aquatic habitats that it provides. A distinctive feature of the New York landscape with regard to aquatic wildlife is the coastal habitats along Long Island and New York City as this area includes open ocean, estuaries, bays, inlets, and other coastal features that provide habitat for a multitude of wildlife.

[125] Anadromous: “Referring to the lifecycle of fishes, such as salmon, in which adults travel upriver from the sea to breed, usually returning to the area where they were born.” (USEPA, 2015v)
[126] Catadromous: “An organism which lives in fresh water and goes to the sea to spawn, such as some eels.” (USEPA, 2015w)

Freshwater Fish

New York is home to more than 165 species of freshwater fish, ranging in size from small darters and minnows to large species such as salmon and sturgeon (NYSDEC, 2015aw). These species are grouped into 11 families: true bass, catfishes, herrings, common minnows, true perch, pikes, common prey fish, salmon, sturgeons, sunfish, and trout. Many of these fish families include diadromous species, such as the anadromous American shad (*Alosa sapidissima*), river herring, striped bass (*Morone saxatilis*), and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), and the catadromous American eel (*Anguilla rostrata*). A brief description of each of these families is provided below.

The true bass family includes four species, including the white bass (*Morone chrysops*) and striped bass (discussed further under “Saltwater Fish”). Catfish include brown bullhead (*Ameiurus nebulosus*) and channel catfish (*Ictalurus punctatus*), and smaller catfish, such as madtoms and stonecats (*Noturus flavus*) (Kraft et al., 2006). Members of the herring family, sometimes fished for intentionally, are also an important commercial fish and food source for other fish; the Hudson River is home to all members of the herring family (NYSDEC, 2015ax).

Approximately 50 species of minnows occur in New York, with five of them being introduced (i.e., non-native) species such as the common carp (*Cyprinus carpio*) and goldfish (*Carassius auratus*) (Kraft et al. 2006). Native minnow species include the creek chub (*Semotilus atromaculatus*), golden shiner (*Notemigonus crysoleucas*), common shiner (*Luxilus cornutus*), and numerous genera of dace, all of which are widely distributed throughout the state (Kraft et al., 2006). As with herring, minnows are not a popular sportfish, but are a commercially important fish and an important food source for larger fish and other wildlife (NYSDEC, 2015ay).

Twenty-one true perch species occur in New York, including larger sized species such as yellow perch (*Perca flavescens*), walleye (*Sander vitreus*), and sauger (*Sander canadensis*), and small members such as darters. Walleye occur in every major New York watershed and are an important gamefish in the state supporting major recreational fisheries in Lake Erie, Lake Oneida, Lake Chautauqua, and Lake Champlain (NYSDEC, 2015aw).

The state’s salmon family can be separated into the native Atlantic salmon and the introduced Pacific salmon. There is only one species of Atlantic salmon and four species of Pacific salmon: Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*Oncorhynchus kisutch*), kokanee salmon (*Oncorhynchus nerka*), and pink salmon (*Oncorhynchus gorbuscha*) (NYSDEC, 2015aw). These species can be found along the entire length of New York’s coastline. Chinook salmon and pink salmon can also be found in the Great Lakes (NYSDEC, 2015az).

There are three species of the sturgeon family in New York: the endangered Atlantic sturgeon, the threatened lake sturgeon (*Acipenser fulvescens*), and the endangered shortnose sturgeon (*Acipenser brevirostrum*). Because of their scarcity, sturgeon are no longer an important commercial fish species (Kraft et al., 2006). The depression in populations of sturgeon is the result of over-collection of these species for caviar and loss of habitat (NYSDEC, 2015ba).

The sunfish family includes 14 species, many of which are among the state's most widely recognized and popular game fish. The most commonly encountered species are the bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*). These sunfish species live in a wide variety of habitats, including rocky, cool lakes and streams, and slow-moving streams (NYSDEC, 2015aw).

New York has four species of trout: lake trout (*Salvelinus namaycush*), brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*). These species are among the most popular game fish in New York living in a wide range of habitats, from mountain streams to the Great Lakes (NYSDEC, 2015aw).

Saltwater Fish

New York's nearshore marine waters are home to a large number of fish species inhabiting the wide variety of marine habitats such as the New York-New Jersey Harbor Estuary, the mouth of the Hudson River, numerous smaller bays and estuaries, the Long Island Sound, and miles of Atlantic coastline. Long Island is situated in such a way that both northern and southern fish species occupy the surrounding waters, and the fish community on either end of the island can also vary widely at any given time (NYSDEC, 2007b).

Many saltwater fish species are known for their recreational and commercial fishing value. The anadromous striped bass is an important fish species for both recreational anglers and the commercial fishing industry. Primary spawning grounds for the striped bass include the Hudson River in New York and the Chesapeake Bay farther south (NYSDEC, 2015bb). Recreational and commercial fishing regulations in the Hudson River and its estuary are closely tied to the levels of polychlorinated biphenyl (PCB) detected in Hudson River sediment, water, and fish tissue. The USEPA and NYSDEC continually monitor PCB levels and govern fishing prohibitions and restrictions (USEPA, 2015m) (NYSDEC, 2015v). In addition to striped bass, these regulations apply to species such as hickory shad (*Alosa mediocris*) and American eel (Stegeman & Gelardi, 2007). High levels of PCB in fishes leads to restrictions and prohibitions on commercial and recreational fishing in the Hudson River and the New York-New Jersey Harbor Estuary (Faber, 1986).

Smaller sportfish found in New York waters include Atlantic menhaden (*Brevoortia tyrannus*) and Atlantic herring (*Clupea harengus*). When water temperatures are warm, species like the scup (*Stenotomus chrysops*) and summer flounder (*Paralichthys dentatus*), move into New York's coastal waters. Little skate (*Leucoraja erinacea*) and windowpane flounder (*Scopthalmus aquosus*), sometimes intentionally fished for, are often caught by anglers fishing for summer flounder. Winter flounder migrate to deeper waters in the summer, while juveniles[127] remain in inshore areas (Stegeman & Gelardi, 2007). Table 11.1.6-5presents a list of popular saltwater sportfish in New York.

[127] Juvenile: "Any member of a species that is not yet sexually mature." (USEPA, 2015n)

Table 11.1.6-5: Popular Saltwater Sportfish Species in New York

Common Name	General Habitat
American eel	Permanent freshwater streams (nonbreeding), open ocean (breeding)
Atlantic cod	Hard sea bottoms with rocks, cobble, gravel, or sand
Atlantic herring	Open ocean, with a preference for nearshore areas
Atlantic mackerel	Open ocean, with a preference for near-surface in warmer months and deeper in winter months
Atlantic menhaden	Open ocean and estuaries
Black sea bass	Bays and sounds with hard bottoms averaging 180 offshore
Cunner (Bergall)	Rocky areas and around pilings, seawalls, wharves, and seaweed beds
Gray triggerfish	Open ocean, with a preference for shallow waters
Hickory shad	Large rivers (breeding), open ocean (nonbreeding)
Little skate	Sandy or gravelly bottoms from shoal waters up to 300 feet from shore
Northern kingfish	Shallow coastal waters
Northern puffer	Bays, estuaries, and protected coastal waters
Scup (Porgy)	Inner continental shelf (breeding); estuaries and inshore (larvae)
Shortfin mako	Open ocean
Striped bass	Coastal, within a few miles of shore except during migration; large rivers (breeding)
Striped searobin	Sandy bottom estuaries and nearshore
Summer flounder (fluke)	Coastal (nonbreeding), deeper ocean (breeding)
Tautog (Blackfish)	Coastal, in rocky areas and around pilings, breakwaters, and wrecks
Weakfish	Along beaches, inlet mouths, and large estuaries; deeper ocean during winter
Windowpane flounder	Sandy and muddy bottoms nearshore to 150 feet offshore
Winter flounder	Deeper waters (summer), shallow estuaries, rivers, and bays (winter)

Source: (Stegeman & Gelardi, 2007)

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act identifies and protects those fish habitats that are necessary for spawning, breeding, feeding, or growth to maturity. These habitats are termed "Essential Fish Habitat" or EFH. NOAA provides an online mapping application[128] and website[129] to provide the public a means to obtain illustrative representations of EFH. This tool can be used to identify the existing conditions for a project location to identify sensitive resources. Table 11.1.6-6 presents a summary of EFH offshore of New York.

Table 11.1.6-6: Essential Fish Habitat Offshore of New York

Common Name	Eggs	Larvae/YOY[130]	Juveniles	Adults
Atlantic bluefin tuna	NA	NA	New York Bight	Eastern end of Long Island
Atlantic cod	NA	Eastern end of Long Island	NA	Eastern and southwestern end of Long Island
Atlantic herring	NA	South shore Long Island	New York Bight and Long Island Sound	New York Bight and Long Island Sound
Basking shark	NA	NA	South shore (in part) and eastern end of Long Island	South shore (in part) and eastern end of Long Island

128 http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html.
129 http://www.greateratlantic.fisheries.noaa.gov/hcd/list.htm.
130 YOY (Young of the year): "All of the fish of a species that were born in the past year, from transformation to juvenile until January 1." (USEPA, 2015o)

Common Name	Eggs	Larvae/YOY[130]	Juveniles	Adults
Dusky shark	NA	NA	New York Bight	New York Bight
Clearnose skate	NA	NA	Lower New York Bay	Lower New York Bay
Haddock	NA	Southeastern shore of Long Island	NA	NA
Little skate	New York Bight	NA	New York Bight and Long Island Sound	New York Bight (in part) and Long Island Sound
Monkfish	New York Bight	New York Bight	Southwest and south shore of Long Island	Southwest and south shore of Long Island
Ocean pout	South shore of Long Island	South shore of Long Island	NA	South shore of Long Island and Long Island Sound (in part)
Pollock	NA	NA	Long Island Sound	Long Island Sound
Red hake	New York Bight and Long Island Sound	New York Bight and Long Island Sound	New York Bight and Long Island Sound	Lower New York Bay and Long Island Sound
Sand tiger shark	NA	New York Bight	NA	NA
Sandbar shark	NA	NA	New York Bight	New York Bight
Scalloped hammerhead shark	NA	NA	NA	South-central shore of Long Island
Shortfin mako shark	NA	New York Bight	New York Bight	New York Bight
Silver hake	New York Bight	New York Bight	New York Bight	Lower New York Bay (in part) and Long Island Sound (in part)
Skipjack tuna	NA	NA	South shore and eastern end of Long Island (in part)	Southeastern shore of Long Island
Thresher shark	NA	New York Bight	New York Bight	New York Bight
Tiger shark	NA	NA	New York Bight	New York Bight
White shark	NA	NA	New York Bight	New York Bight
Witch flounder	South shore of Long Island (in part)	Southeastern shore of Long Island	NA	NA
Windowpane flounder	New York Bight and Long Island Sound	New York Bight and Long Island Sound	New York Bight and Long Island Sound	New York Bight and Long Island Sound
Winter flounder	New York Bight (in part) and Long Island Sound	New York Bight (in part) and Long Island Sound	New York Bight (in part) and Long Island Sound	New York Bight (in part) and Long Island Sound
Winter skate	NA	NA	New York Bight and Long Island Sound	Long Island Sound and south shore of Long Island (in part)
Yellowtail flounder	New York Bight	New York Bight	Southeastern shore of Long Island	Southeastern shore of Long Island
Yellowfin tuna	NA	NA	Eastern end of Long Island	NA

Source: (NOAA, 2015a) (NOAA, 2015b)
Notes: NA = Not Applicable

Shellfish and Other Invertebrates

New York is home to both freshwater and marine shellfish. Familiar freshwater bivalve[131] species include a variety of mussel species, such as the east elliptio mussel (*Elliptio complanata*), rainbow mussel (*Villosa iris*), fat mucket mussel (*Lampsilis siliquoidea*), pocketbook mussel (*Potamilus capax*), and pearly mussels. Aside from a multitude of freshwater invertebrates whose adult forms are terrestrial insects (e.g., flies, beetles, etc.), other New York freshwater invertebrates that spend their lives in aquatic systems include the crayfish, apple snails, and river snails (Galiano, 2015).

Eight native species of marine shellfish and other invertebrates occur in New York, including five mollusks and three crustaceans (NYSDEC, 2015bc) (NYSDEC, 2015bd). Bay scallops prefer shallow coastal bays and estuaries with sandy and muddy bottoms and eelgrass beds. In New York, these species are most commonly found on the eastern end of Long Island, and also Great South Bay, Moriches Bay, and Shinnecock Bay. Atlantic surf clams (*Spisula solidissima*) are found in sand and muddy sand seabeds from subtidal areas to approximately 100 feet deep. Eastern oysters (*Crassostrea virginica*) prefer intertidal and subtidal zones. Hard clams are found along beaches and bays in sand or muddy sand. Longfin squid (*Doryteuthis pealeii*) are primarily caught in the ocean, but in the summer they can be caught inshore (NYSDEC, 2015bc).

Lobsters and crabs are familiar crustaceans found in New York. American lobster (*Homarus americanus*) habitat extends on the ocean floor in the northwest Atlantic Ocean, both nearshore and in distant waters. Lobsters are a common resident of New York's rocky coastline, where they can capture prey and hide from predators in crevices. There is a substantial lobster fishery in western Long Island Sound. Blue crabs (*Callinectes sapidus*) feed and forage throughout local bays and estuaries in New York when water temperatures are warm. In winter months, crabs move into deeper waters and bury themselves, where they remain dormant until warmer temperatures return (NYSDEC, 2015bd). In New York, Atlantic horseshoe crabs occur year-round in Long Island Sound, Great South Bay, and in other areas along the coast. Horseshoe crabs spawn in May and June, when thousands can be seen along Long Island beaches. Horseshoe crabs are used by fisherman as bait and in the pharmaceutical industry for medical research (NYSDEC, 2015be).

Marine Mammals

Whale species traveling through New York waters include the finback whale (*Balaenoptera physalus*), minke whale (*Balaenoptera acutorostrata*), sei whale (*Balaenoptera borealis*), North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), blue whale (*Balaenoptera musculus*), and sperm whale (*Physeter microcephalus*). All but the minke whale are listed as endangered under the Endangered Species Act (ESA). NYSDEC identifies one seal species, the harbor seal, as the most abundant occurring in New York waters (NYSDEC, 2015bf). This section briefly introduces the marine mammal species found in New York waters.

[131] Bivalve: "An aquatic mollusk whose compressed body is enclosed within a hinged shell." (USEPA, 2015p)

Many whale species occur offshore of New York as they migrate northward towards feeding grounds and southward towards warmer waters for breeding. Their presence offshore is often unnoticed because of their transient nature and deep ocean preference. Occasionally individuals are beached or stranded along the coast, but these are relatively rare occurrences (NYSDEC, 2015t).

A few whale species exhibit distinctive behaviors. For example, in contrast to migratory patterns displayed by other whale species, minke whales breed during the summer months in the northern hemisphere; however, they spend very little time at the surface and are therefore rarely seen. Whereas sei whales feed far offshore in the open ocean and are unlikely to approach nearshore areas (NYSDEC, 2015bg). Humpback whales are the most commonly observed whale during whale watch tours in New York (NYSDEC, 2015bh). The North Atlantic right whale spends the spring and summer months off the coast of New England; therefore, their occurrence in New York waters is rare (NYSDEC, 2015bi).

According to NYSDEC, the harbor seal is the dominant seal species that occurs in New York's waters. While other seal species may also occur offshore of New York, these sightings are generally attributed to rogue individuals roaming south of their range. The harbor seal inhabits New York's coastal waters and spends most of their time basking on sand bars or offshore rocks (NYSDEC, 2015bf). Harbor seals may also be found upstream in mouths of rivers and even in some northern populations in freshwater lakes as they search for food during high tides. Harbor seals have limited seasonal movement (Whitaker, 1980) and can generally be found at Cupsogue Beach State Park, East and West Shinnecock County Park, Fire Island National Seashore, Jamaica Bay Wildlife Refuge, and Montauk Point State Park (NYSDEC, 2015bf). New York and New Jersey make up the southern limit of harbor seals distribution along the East coast (Sarner, 1996).

Other seal species sighted occasionally in New York waters, include the harp seal (*Pagophilus groenlandicus*), gray seal (*Halichoerus grypus*), and hooded seal (*Cystophora cristata*). Harp seals and hooded seals normally prefer deep seas and thick ice to rest upon; gray seals prefer strong currents and bask along rocky shores of temperate waters (Burt, 1976).

Sea Turtles

Six species of sea turtles occur in US waters, all of which are protected under the ESA. Three of these sea turtles occur in New York's waters, including the green sea turtle (*Chelonia mydas*), Hawksbill sea turtle (*Eretmochelys imbricata*), and leatherback sea turtle (*Dermochelys coriacea*). Sea turtles are typically observed off the coast of Long Island. For more information on these protected sea turtles, refer to Section 11.1.6.6, Threatened and Endangered Species.

Invasive Aquatic Species

As previously discussed, New York has adopted regulations that prohibit or regulate select invasive plant and animal species. There are 26 prohibited or regulated fish and 20 prohibited or regulated aquatic invertebrates in New York. Some of the more troublesome invasive aquatic species include the Chinese mitten crab (*Eriocheir sinensis*), northern snakehead fish (*Channa* *argus*), sea lamprey (*Petromyzon marinus*), Asian clam (*Corbicula fluminea*), zebra mussel (*Dreissena polymorpha*), quagga mussel (*Dreissena bugensis*), fishhook waterflea (*Cercopagis pengoi*), spiny waterflea (*Bythotrephes longimanus*), bloody red shrimp (*Hemimysis anomala*), Chinese mystery snail (*Cipangopaludina chinensis*), round goby (*Neogobius melanostomus*), and white perch (*Morone americana*) (NYSDEC, 2015bj) (NYSDEC, 2015bk).

11.1.6.6 Threatened and Endangered Species and Species of Conservation Concern

The USFWS is responsible for administering the ESA (16 U.S.C §1531 et seq.) in New York. The USFWS has identified 10 federally endangered[132] and 12 federally threatened[133] species known to occur in New York (USFWS, 2013a). Of these the piping plover (*Charadrius melodus)* has designated critical habitat[134] within New York (USFWS, 2015c). The federally listed species and include two mammals, three birds, four reptiles, five invertebrates, and eight plants, and are discussed in detail under the following sections (USFWS, 2013a).

Mammals

Research identified two federally protected bat species in New York. Details on these species are presented below and summarized in Table 11.1.6-7. The Northern long-eared bat *(Myotis septentrionalis)* and Indiana bat *(Myotis sodalis)* are found throughout the state. Information on the habitat, distribution, and threats to the survival and recovery of each of these species is summarized below.

Table 11.1.6-7: Federally Listed Mammal Species of New York

Common Name	Scientific Name	Federal Status [a]	Critical Habitat	Habitat Description
Indiana Bat	*Myotis sodalis*	E	No	Wooded areas in three distinct population areas of central, eastern and southern New York
Northern Long-eared Bat	*Myotis septentrionalis*	T	No	Tree crevices and snags; caves and abandoned mines throughout New York

Source: (USFWS, 2013a)
[a] E = Endangered, T = Threatened

Indiana Bat. The Indiana bat is a small, insectivorous[135] mammal measuring approximately 1.5 to 2 inches long and strongly resembles the more common little brown bat (*Myotis lucifugus*) (USFWS, 2010). Federally listed in 1967, the Indiana bat was classified as endangered in 1973

[132] Endangered species are “any species which is in danger of extinction throughout all or a significant portion of its range. (16 U.S.C §1532(6)) (USEPA, 2015f)
[133] Threatened species are “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” (16 U.S.C §1532(20)) (USEPA, 2015f)
[134] Critical habitat includes “the specific areas (i) within the geographic area occupied by a species, at the time it is listed, on which are found those physical or biological features (I) essential to conserve the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by the species at the time it is listed upon determination that such areas are essential to conserve the species.” (16 U.S.C §1532(5)(A)) (USEPA, 2015f)
[135] Insectivorous: “An animal that feeds on insects.” (USEPA, 2015q)

(USFWS, 2015d). Regionally, this species is found in the central portion of the eastern U.S., from Vermont west to Wisconsin, Missouri, and Arkansas, and south and east to northwest Florida. In New York, there are 10 known hibernation[136] sites (hibernacula) in 6 counties: Albany (1), Essex (2), Warren (1), Jefferson (1), Onondaga (1), and Ulster (4). One of the hibernation sites in Ulster is among the 10 largest in the country (NYNHP, 2013a). These populations are generally divided between the eastern border of the state and centrally near the Great Lakes watershed (USFWS, 2015e).

Indiana bats roost in trees during the day and feed at night in a variety of habitats, although they prefer streams, floodplain forests, ponds, and reservoirs in wooded and semi-wooded areas. Females and males roost separately in colonies in dead or dying trees raising a single offspring each year. The physical characteristics of individual trees (i.e., loose bark) appear to be more of a factor than the species of tree. In the fall, Indiana bats migrate to the vicinity of their hibernation sites (hibernacula) to mate and accumulate fat reserves for their winter hibernation (USFWS, 2010).

The threats to this species include the disturbance and intentional killing of hibernacula and maternity colonies, disturbances to air flow in caves from the improper installation of security gates, habitat fragmentation[137] and degradation[138], the use of pesticides or other environmental contaminants, and White Nose Syndrome (USFWS, 2004) (USFWS, 2010). White Nose Syndrome, first documented in New York in 2006, is a rapidly spreading fungal disease that afflicts hibernating bats (USGS-NWHC, 2015) (NYSDEC, 2012c). Although all of the life stages of Indiana bat are vulnerable to adverse impacts, they are most sensitive during hibernation, thus conservation efforts have focused on this vulnerable period (NYSDEC, 2015bm).

Northern Long-eared Bat. The northern long-eared bat (*Myotis septentrionalis*) is a medium-sized (3 to 3.7 inches in length), brown furred, insectivorous bat with long ears, relative to other members of the genus *Myotis*. It was listed as threatened in 2015 (80 FR 17973 18033, April 2, 2015 (USFWS, 2015f). In the U.S., its range includes most of the eastern and north central states, and encompasses all 62 counties of New York (USFWS, 2015g) (USFWS, 2015f).

This species hibernates in caves and mines that exhibit constant temperatures, high humidity, and no air currents. In the summer, individuals roost[139] singly or in colonies beneath bark, or in crevices or cracks of both live and dead trees. Although mating occurs in the fall, fertilization

[136] Hibernation: “The act of passing the winter in a dormant state in which the metabolism is slowed to a tiny fraction of normal.” (USFWS, 2015m)
[137] Fragmentation: “The breaking up of large and continuous ecosystems, communities, and habitats into smaller areas that are surrounded by altered or disturbed land or aquatic substrate.” (USEPA, 2015r)
[138] Degradation: “The reduction of the capacity of the environment to meet social and ecological objectives, and needs. Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards.” (USEPA, 2015s)
[139] Roost: “A place where a flying animal, usually a bird or bat, can sleep or rest, usually by perching or hanging.” (USFWS, 2015i)

occurs following hibernation[140], from which pregnant females then migrate to summer areas where they roost in small colonies (USFWS, 2015f).

White Nose Syndrome is the leading cause for the decline of this species. The numbers of northern long-eared bats in hibernacula has decreased by 99 percent in the northeast U.S. Other threats include temperature or air flow impacts to their hibernating habitat, forest management practices that are incompatible with this species' habitat needs, habitat fragmentation, and wind farm operations (USFWS, 2015f).

Birds

Two endangered and one threatened bird species are federally listed and known to occur in New York, as summarized in Table 11.1.6-8. Piping plovers (*Charadrius melodus*) are found along the coastal areas of New York and within the Great Lakes watershed, while red knots (*Calidris canutus rufa*) and roseate terns (*Sterna dougallii dougallii*) are primarily found within coastal regions. In addition, critical habitat has been designated for the piping plover in New York for the Great Lakes breeding population. Information on the habitat, distribution, and threats to the survival and recovery of each of these species in New York is provided below.

Table 11.1.6-8: Federally Listed Bird Species of New York

Common Name	Scientific Name	Federal Status [a]	Critical Habitat	Habitat Description
Piping plover	*Charadrius melodus*	E/T	Yes; Great Lakes watershed population	Coastal areas of New York, and a central population near the Great Lakes
Red knot	*Calidris canutus rufa*	T	No	Coastal areas of New York
Roseate tern	*Sterna dougallii dougallii*	E	No	Coastal areas of New York

Source: (USFWS, 2013a)
[a] E = Endangered, T = Threatened

Piping plover Photo credit: USFWS

Piping Plover. The piping plover is a small, pale-colored shorebird with a short beak and black band across the forehead, listed as endangered in 1985 for the Great Lakes watershed of both the U.S. and Canada, and as threatened in the remainder of its range in the U.S., which includes the Northern Great Plains, Atlantic and Gulf Coasts, Puerto Rico, Virgin Islands (50 FR 50726 50734, Dec 11, 1985) (USFWS, 2015h). Piping plovers breed in three geographic regions of North America, composed of two separate subspecies (USFWS, 2015i). Those breeding within New York in the northeastern U.S. and Canada are of the subspecies *C. m. melodus*, whose range extends from the Atlantic to the Great Lakes (USFWS, 2015h). Piping plover subspecies (*C. m. melodus*) can be found on Long Island's sandy beaches, including the

[140] Hibernation: "The act of passing the winter in a dormant state in which the metabolism is slowed to a tiny fraction of normal." (USFWS, 2015j)

Borough of Queens in New York City, eastward to the Hamptons area of Long Island, on Fire Island, and in the eastern bays and harbors of northern Suffolk County (NYSDEC, 2015bn).

Critical habitat was designated for the Great Lakes population in 2001 (66 FR 22938 22969 , May 7, 2001) and the Northern Great Plains population in 2002 (67 FR 57638 57717, Sep 11, 2002). For New York, designated critical habitat is along the eastern shore of Lake Ontario, spanning Oswego and Jefferson Counties. This area is been described as "Lands 500 1,640 feet inland from normal high water line from the mouth of the Salmon River (Pulaski quad) northward along the Lake Ontario shoreline to the Oswego County-Jefferson County line (Ellisburg quad) and northward to the Eldorado Road (Henderson quad)" (Doddridge, 2001).

This species feeds in the intertidal zone of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines, and the shorelines of coastal ponds, lagoons, and salt marshes. They feed on worms, fly larvae, beetles, crustaceans, and other marine macroinvertebrates (NYSDEC, 2015bn). Current threats to this species include habitat loss and habitat degradation, human disturbance, pets, predation[141], flooding from coastal storms, and environmental contaminants (NYSDEC, 2015bn).

Red Knot. Federally listed as a threatened species in 2014 (79 FR 73705 73748, Dec 11, 2014), the red knot is a large sandpiper that flies in large flocks along the Delaware Bay and the Atlantic coast each spring (USFWS, 2015j) (USFWS, 2015k). Red knots spend their winters in the southern tip of South America, northern Brazil, the Caribbean, and the southeastern and Gulf Coasts of the U.S. and breed in the tundra of the central Canadian Arctic. Some have been documented to fly more than 9,300 miles from south to north every spring and return south in autumn (USFWS, 2015k). Red knots are observed in at least four New York counties, including Kings, Nassau, Queens, and Suffolk, primarily during migration periods when they are moving either to or from breeding areas in the Canadian Arctic. Nevertheless, the range of counties needs to be further refined and the entirety of New York is currently considered within the species' potential range.

The red knot stops along the Atlantic coast during the spawning season for the horseshoe crab (*Limulus polyphemus*) , feeding on horseshoe crab eggs, and mussel and clam beds, which are important food sources to the species. Threats to the red knot include sea level rise; coastal development; shoreline stabilization; dredging; reduced food availability at their migration stopovers; and disturbance by humans, dogs, vehicles, and climate change (USFWS, 2015k).

Roseate Tern. The roseate tern is approximately 15 inches in length with light-gray wings and a black cap. During breeding season, the roseate tern's white chest gains a rosy tinge on the chest, and its bill and legs turn from black to orange-red (USFWS, 2011a). The tern was listed as endangered in 1987 in the Northeast region and threatened in the southeast region (52 FR 42064 4206, November 2, 1987) (USFWS, 2015l). In general, the species is present along the coasts of the Atlantic, Pacific, and Indian Oceans. In eastern North America, the roseate tern breeds from the Canadian Maritime Provinces south to New York (USFWS, 2011a). Roseate terns are observed in at least one New York county, Suffolk, however the range of counties needs to be

[141] Predation: "The act or practice of capturing another creature (prey) as a means for securing food." (USEPA, 2015u)

further refined, and the entirety of New York is currently considered within the species' potential range (USFWS, 2015l).

The species is a marine bird that breeds along the coasts on salt marsh islands and beaches with sparse vegetation. Present threats include vegetation changes in breeding areas, competition with gulls for suitable nest sites, and predation (USFWS, 2011a).

Reptiles

Two endangered and two threatened turtles are federally listed and known to occur in New York as summarized in Table 11.1.6-9; one snake, Eastern massasauga (*Sistrurus catenatus*), is listed as a candidate species, and is not discussed below. The listed sea turtles—green (*Chelonia mydas*), hawksbill *(Eretmochelys imbricata)* and leatherback *(Dermochelys coriacea)*—are found off the coast of Long Island. The bog turtle (*Clemmys muhlenbergii*) is predominantly found in central and south eastern counties of the state. Information on the habitat, distribution, and threats to the survival and recovery of each of these species in New York is provided below.

Table 11.1.6-9: Federally Listed Reptile Species of New York

Common Name	Scientific Name	Federal Status [a]	Critical Habitat	Habitat Description
Green Sea Turtle	*Chelonia mydas*	T	No	Off the coast of Long Island
Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	No	Off the coast of Long Island
Leatherback Sea Turtle	*Dermochelys coriacea*	E	No	Off the coast of Long Island
Bog Turtle	*Clemmys muhlenbergii*	T	No	Swamps and bogs of south eastern New York or along the southern coast of Lake Ontario.

Source: (USFWS, 2013a)
[a] E = Endangered, T = Threatened

Green Sea Turtle. The green sea turtle occurs throughout tropical and subtropical oceans and is among the largest of the hard-shelled sea turtles growing to as much as 440 pounds and four feet in length. The breeding populations in Florida were listed as endangered in 1978 (43 FR 32800 32811) whereas all other populations were listed as threatened (NOAA, 2015d). They are found in the shallow waters (except during migration) of shoals, bays, lagoons reefs, and inlets, often where submerged aquatic vegetation exists, from Maine south to Florida, and throughout the Gulf of Mexico and the Caribbean Sea (USFWS, 2015n) (USFWS, 2015o) (USFWS, 2015p). Green sea turtle nests are not present in New York; however, they occasionally are found stranded on or near the shore (NYSDEC, 2015bp). Breeding takes places in subtropical to tropical oceans every two, three, or four years between June and September, with peak nesting in June and July (NOAA, 2015d) (USFWS, 2015n). Hatching usually occurs at night, and many green sea turtle hatchlings seek refuge and food in masses of floating sea plants (USFWS, 2015n).

The collection of green sea turtles for food was the primary cause for the decline of this species; however, current threats include disease, loss or degradation of nesting habitat; disorientation of hatchlings by lighting; nest predation; marine pollution; watercraft strikes; and incidental take from channel dredging and commercial fishing operations (USFWS, 2015n).

***Hawksbill Sea Turtle*.** The hawksbill sea turtle is one of the smaller sea turtles with a dark brown upper shell with yellow streaks and a yellow under shell. It was listed as endangered in 1970 (35 FR 8491 8498) and was grandfathered into the ESA of 1973 (USFWS, 2015q). The species has overlapping plates that are thicker than those of other sea turtles. This protects them from being battered against sharp coral and rocks during storm events. Adults range in size from 30 to 36 inches and weigh up to 300pounds. The hawksbill is found throughout all of the oceans of the world (USFWS, 2015q). Although in the Atlantic they range from the East Coast of the U.S. to northern Brazil, they are occasionally found offshore of New England and are a rare visitor to the northeast (NYSDEC, 2015bq) (NOAA, 2015e). This species prefers warm, shallow, coastal waters of reefs, lagoons, inlets, and bays with submerged aquatic vegetation. It is an omnivore, feeding mostly sponges and is most often associated with the coral reef community. Nesting occurs on remote beaches in the Gulf of Mexico and the Caribbean Sea in two to three year cycles (USFWS, 2015q).

Current threats to the hawksbill sea turtle include: accidental capture in fishing lines, vessel strikes, contaminants, oil spills, disease, habitat loss of coral reef communities, and commercial exploitation. Outside of the U.S., a current threat is the collection for meat, eggs, and parts, which was the historic threat to this species causing their decline (USFWS, 2013a).

Leatherback Sea Turtle. The leatherback sea turtle is the largest, most migratory, deepest-diving, and most wide-ranging sea turtle, found in all of the world’s oceans. Adult leatherback sea turtles can weigh up to 2,000 pounds and grow up to 6.5 feet in length (NOAA, 2015f). It was listed as endangered in 1970 (35 FR 8491 8498) and was grandfathered into the ESA of 1973 (NOAA, 2015f). The leatherback sea turtle ranges as far north as the Gulf of Maine and Newfoundland and in New York may be found along the coasts of Long Island (NYSDEC, 2015br) (USFWS, 2015r). Their diet consists of jellyfish and squid and while they may forage in coastal waters but they prefer open sea environments (NOAA, 2015f) (USFWS, 2015s).

Female leatherback sea turtles nest at 2 to 3 year intervals on beaches composed of coarse sand that are adjacent to deep water and subject to erosion (USFWS, 2015s). Major threats to the species include harvesting of their eggs, hunting, their incidental capture in fishing gear, and consumption of plastics that were mistaken for jellyfish (NOAA, 2015f).

Bog turtle Photo credit: USFWS

Bog Turtle. The threatened bog turtle is a very small turtle, averaging 3.1 to 4.5 inches in length (USFWS, 2015t) and it is characterized by a light brown to ebony shell and bright yellow, orange, or red blotches on each side of the head (USFWS, 2001). The USFWS proposed a final rule in 1997 to list the northern population of the bog turtle as threatened and southern population as threatened due to similarity of appearance, under provisions of the ESA of 1973 (62 FR 59605 59623). Regionally the northern population of the bog turtle is known to occur in localized distributions from western Massachusetts and Connecticut southward to Maryland, and the southern population is known to occur from Virginia southward to Georgia (USFWS, 2001). In New York it is known to occur in 15 counties in the southeastern region of the state or along the south coast of Lake Ontario (USFWS, 2015t).

The bog turtles prefer habitats that are open wetlands, sedge meadows, and boggy areas with cool, shallow, slow-moving water, deep and soft muck soils, and with tussock-forming vegetation (clumpy grasses) (USFWS, 2001) (USFWS, 2011b). For hibernation, the bog turtle generally retreats to densely vegetated areas. In New York, bog turtles hibernate in October and tend to emerge from hibernation in late March and April. Mating usually occurs in the spring or right after hibernation followed by nesting from June to July (USFWS, 2001).

Current threats to this species are habitat loss and fragmentation from development. Additionally, this species is under threat of vegetation succession and invasion of nonnative plants, such as purple loosestrife (*Lythrum salicaria*), which out-complete native wetland plants that provided food or nesting sites for this species. The illegal collection of bog turtles has also been a major threat to the bog turtles throughout the species' range (USFWS, 2001).

Invertebrates

Four endangered and one threatened invertebrate species are federally listed and known to occur in New York, as summarized in Table 11.1.6-10. One snail, the Chittenango Ovate Amber Snail (*Novisuccinea chittenangoensis)* is only located at the Chittenango waterfalls in central New York. The three mussels: clubshell (*Pleurobema clava*), dwarf wedgemussel (*Alasmidonta heterodon)*, and rayed bean (*Villosa fabali)* are found in rivers in various parts of the state and the Karner blue butterfly (*Lycaeides melissa samuelis)* is primarily found in the Hudson River Valley. Information on the habitat, distribution, and threats to the survival and recovery of the species in New York is provided below.

Table 11.1.6-10: Federally Listed Invertebrate Species of New York

Common Name	Scientific Name	Federal Status [a]	Critical Habitat	Habitat Description
Chittenango Ovate Amber Snail	*Novisuccinea chittenangoensis*[142]	T	No	Chittenango waterfalls in central New York
Clubshell Mussel	*Pleurobema clava*	E	No	Rivers of western New York in the Lake Erie watershed.
Dwarf Wedgemussel	*Alasmidonta heterodon*	E	No	Rivers of south eastern New York
Karner Blue Butterfly	*Lycaeides melissa samuelis*	E	No	Hudson River Valley
Rayed Bean Mussel	*Villosa fabalis*	E	No	Tributaries of the Allegheny River

Source: (USFWS, 2013a)

[a] E = Endangered, T = Threatened

Chittenango Ovate Amber Snail. The Chittenango ovate amber snail was federally listed as endangered in 1978 (43 FR 28932 28935). Their range is restricted to one location, a 100-foot waterfall located at Chittenango State Park in Central New York. This species feeds on species grown within the waterfall spray, such as minute algae and microflora. Chittenango ovate amber snails live approximately two and a half years and mate from the months of April until June. They are intolerant to sudden changes in their environment and rely on the clean water of the waterfall, thus factors such as water pollution, agriculture runoff, high salinity from road salt, human disturbances, environmental sensitivity, and the introduction of a closely related pest species are current threats to this species (NYSDEC, 2015bs).

Clubshell Mussel. The clubshell mussel is a federally endangered species that was designated in 1993 (58 FR 5638 5642). In New York, this brown colored mussel is found only in Cattaraugus and Chautauqua Counties (USFWS, 2015u). Preferred habitat for the clubshell is clean, loose sand and gravel in rivers or stream beds of up to four inches in depth. The clubshell occurs in less than five percent of its historic range and is only found in portions of 12 streams. It requires clean, flowing streams or small rivers to fertilize and hatch their eggs and sufficient populations of host fish where the larvae further develop until they settle in the stream bed. Threats to the species include agricultural and industrial pollution, invasive species, and changes in stream flow or impacts to fish hosts (USFWS, 1997).

Dwarf Wedgemussel. The dwarf wedgemussel is a small (less than 1.5 inches in length), brown or yellowish-brown freshwater mussel. It was listed as endangered in 1990 (55 FR 9447) throughout its range, except along the lower Neversink River in Orange County, New York and the Tar River in North Carolina where they number in the thousands. They are filter feeders feeding off suspended particles and algae, and spending most of their time buried in stream bottoms. They require either the tessellated darter (*Etheostoma olmstedi*) or the mottled sculpin (*Cottus bairdi*) in order to complete their reproductive lifecycle. The dwarf wedgemussel lives for approximately 10 years. Threats to this species include pollution from agriculture and

[142] Note that some sources list the Latin name for the Chitttenango Ovate Amber Snail as *Succinea chittenangoensis* (USFWS, 2016a)

development projects, channelization, and habitat loss resulting from dams and impoundments (NYSDEC, 2015bt).

Karner Blue Butterfly. The Karner blue butterfly has been federally listed as endangered since 1992 (57 FR 59236). Their range extends across 12 states from Minnesota to Maine, including New York (USFWS, 2008a). Previously found in New York City, the Karner blue butterfly is found in particular areas of the Hudson River Valley with populations remaining in Albany, Schenectady, Saratoga, and Warren Counties (USFWS, 2016b). Two hatches occur every year, one approximately in April and another in June. The staple food for the caterpillars is wild lupine (*Lupinus perennis*) which restricts the Karner blue butterfly's distribution. Primary threats to this species include habitat loss and degradation from land development and the lack of natural disturbances from fire and grazing. These disturbances would normally maintain the early successional communities required by this species and wild lupine (USFWS, 2008a).

Rayed Bean Mussel. The rayed bean mussel is a small, freshwater mussel, usually less than 1.5 inches long. Federally listed as endangered in 2012 (77 FR 8632 8665, March 15, 2012), its historical range in North American included 115 streams and lakes; however, current populations are only found in 31 streams and one lake. They live in small headwater creeks and wave-washed areas of glacial lakes with gravel or sandy bottoms. In New York, the rayed bean can be found in Cattaraugus and Chautauqua Counties (USFWS, 2016c). Rayed bean mussels are unable to live in still water and often attach to roots of aquatic vegetation. Threats include sedimentation, dams that restrict natural flow, change in temperatures, habitat loss, reduction of fish populations necessary for their reproductive lifecycle, and invasive species (USFWS, 2012b).

Plants

There are two endangered and six threatened plant species federally listed and known to occur in New York as summarized in Table 11.1.6-11. American hart's-tongue fern (*Asplenium scolopendrium* var. *americanum),* the Leedy's roseroot (*Rhodiola integrifolia* ssp. *leedyi),* and the northeastern bulrush (*Scirpus ancistrochaetus)* are located in specific areas of central New York while Houghton's goldenrod (*Solidago houghtonii)* is endemic to the beaches of the Great Lakes. The northern wild monkshood (*Aconitum noveboracense*) and the small whorled pogonia (*Isotria medeoloides*) are only found in southern New York. The sandplain gerardia (*Agalinis acuta*) and seabeach amaranth (*Amaranthus pumilus*) are found along the coastal grasslands of Long Island. Information on the habitat, distribution, and threats to the survival and recovery of each of these species in New York is provided below.

Table 11.1.6-11: Federally Listed Plant Species of New York

Common Name	Scientific Name	Federal Status [a]	Critical Habitat	Habitat Description
American Hart's-tongue Fern	*Asplenium scolopendrium var. Americanum*	T	No	Moist, shaded, limestone areas in central New York.
Houghton's Goldenrod	*Solidago houghtonii*	T	No	Moist sandy beaches of the Great Lakes
Leedy's Roseroot	*Rhodiola integrifolia ssp. leedyi*	T	No	Moist wooded cliffs of of Seneca Lake, Glenora Falls, and in Watkins Glen State Park
Northeastern Bulrush	*Scirpus ancistrochaetus*	E	No	Wetlands and depressions of Steuben County
Northern Wild Monkshood	*Aconitum noveboracense*	T	No	Along streams and cliffs of the Catskill Mountains
Sandplain Gerardia	*Agalinis acuta*	E	No	Coastal grasslands of Long Island
Seabeach Amaranth	*Amaranthus pumilus*	T	No	Coastal grasslands of Long Island
Small Whorled Pogonia	*Isotria medeoloides*	T	No	Hardwood forest of Schunnemunk State Park in southern New York.

Source: (USFWS, 2013a)

[a] E = Endangered, T = Threatened

American Hart's-tongue Fern. American hart's-tongue fern was federally listed as threatened in 1989 (54 FR 29726-29730). The species has unserrated fronds of 8 to 16 inches and appears tropical amidst their habitat in the northern ever-green forests (USDA, 2014). The species thrives in glacial plunge basins (i.e., depressions produced by historic waterfalls) around cliffs, sinkholes and cave entrances on dolomite and calcareous rocks, requiring cool, moist shaded areas and lime-rich soils (NYNHP, 2013b). In New York, populations occur in the Syracuse area accounting for 90 percent of the U.S. population, specifically, in Onondaga and Madison Counties (USFWS, 2012c). Threats include invasive species, mining operations, drought, and habitat loss (NYNHP, 2013b) (USFWS, 1993c).

Houghton's Goldenrod. Houghton's goldenrod is a perennial plant with small yellow flowers and thin leaves of up to 4.5 inches long (USFWS, 2015v). It was federally listed as threatened in 1988 (53 FR 27134 27137). The species is restricted to calcareous, wetland habitats of the Great Lakes, growing in moist sandy beaches and shallow depressions along shorelines and dunes. The majority of the population is found in Michigan, however Genesee County in New York hosts an isolated population (USFWS, 2006). Threats to the Houghton's goldenrod include development and construction, habitat loss, sand mining, and erosion control that prevents dune formation (USFS, 2015a).

Leedy's Roseroot*.* Leedy's roseroot was federally listed as threatened in 1992 (57 FR 14649). Leedy's roseroot is a cliffside dwelling wildflower with a long, leafy stem and flowers in colors from dark red to yellows. The species is found today in only six locations in Minnesota and New York. Populations in upstate New York may be found along the shores of Seneca Lake, Glenora Falls, and in Watkins Glen State Park (Schulyler, Seneca, and Yates counties) (USFWS, 1998). They occur in moist areas including on sandstone, siltstone, and shale cliffs (NYNHP, 2013c). Threats include encroachment of woody vegetation (i.e., knotweed (*Fallopia japonica*) and swallowwort (*Cynanchum rossicum*)) and habitat loss (NYNHP, 2013c) (USFWS, 1993a).

Northeastern Bulrush. Northeastern bulrush was federally listed as endangered in 1991 (56 FR 21091). The Northeastern bulrush is leafy perennial[143] herb approximately three to four feet tall and a member of the sedge family. The species is a wetland species found in small wetlands and wet depressions with seasonally fluctuating water levels. New York had 113 extant populations with the last recorded observation in 1900; survey efforts in 2009-2010 identified one individual species of Steuben County (USFWS, 1993b) (USFWS, 2016d). Threats to the northeastern bulrush include alterations to the surrounding hydrology[144], either by drier or wetter conditions; habitat loss; and herbivory (USEPA, 2015af)..

Northern Wild Monkshood. Northern wild monkshood was federally listed as threatened in 1978 (43 FR 17910). The species is an herbaceous perennial of between one to four feet in height and has adapted for pollination by bumblebees with hood-shaped blue flowers of approximately one inch in length (USFWS, 2015w). The northern wild monkshood is noteworthy for containing a number of alkaloids and has "been of interest pharmacologically for centuries" (USFWS, 1983). The northern wild monkshood's habitat occurs along cool sites of streams and cliffs. In New York, they are present in Delaware, Sullivan, and Ulster counties (USFWS, 2015x). Threats include degradation and loss of habitat, and collection by humans (USFWS, 2015w).

Sandplain Gerardia. Sandplain gerardia was federally listed as endangered in 1988 (53 FR 34701). It is a light yellowish green annual with pink blossoms. Of the 12 known populations for this species, four are coastal grassland areas located on Long Island (NYNHP, 2015). Preferred habitats are sandy soils of grasslands and roadsides, in pine/oak scrubs, and on scattered patches of bare soils. They cannot survive on their own and require a relationship with the little bluestem (*Schizachyrium scoparium*). Threats to this species include habitat loss from succession, fire suppression, land development, and invasive competitors (USFWS, 2015y) (NYNHP, 2015). Periodic disturbances that create open grassland habitat are necessary for sandplain gerardia's success (NHESP, 2011).

Seabeach Amaranth. Seabeach amaranth was federally listed as threatened in 1993 (58 FR 18035). This annual grows in coastal areas along barrier beaches just above the high tide line and produces round leaves on red stems spreading close to the ground. This species shares habitat with other protected species such as the piping plover and roseate tern. The plants trap sand and subsequently can create mounds up to 3 cubic yards in size (USFWS, 2011c). In New York, 13 populations were newly discovered in 1990 on Long Island beaches, likely a result of Hurricane Hugo uncovering preserved seedbanks. Threats to seabeach amaranth include beach stabilization structures, off-road vehicles, habitat fragmentation, and webworms *(Hyphantria cunea)* that prey heavily on the plants (USFWS, 2011c) (USFWS, 2015z).

[143] Perennial: "Plants that live for more than two growing seasons. Perennial plants either die back after each season (herbaceous plants) or grow continuously (shrubs)." (USEPA, 2015z)
[144] Hydrology: "Hydrology is the science that deals with the properties, movement, and effects of water found on the earth's surface, in the soil and rocks beneath the surface, and in the atmosphere." (USEPA, 2015x)

Small Whorled Pogonia. The small whorled pogonia *(Isotria medeoloides)* is a member of the orchid family, which grows between 10 to 14 inches in height with greenish yellow flowers. The small whorled pogonia was federally listed as endangered in 1982 (47 FR 39827) and in 1994 was reclassified as threatened (59 FR 50852, October 6, 1994) (USFWS, 2015aa). Regionally, this species is known to occur sparsely distributed from Maine south to Georgia and eastern to Illinois (USFWS, 2008b). Locally, the small whorled pogonia is a very rare species with only population of six individual plants known to occur in Schunnemunk State Park, Orange County, New York (NYSPRHP, 2010).

The small whorled pogonia occurs in hardwood stands that have an open understory, preferring acidic soils along small streams that have a thick layer of litter (USFWS, 2008b). Small whorled pogonias bloom from May to June, producing a single tiny yellowish or greenish flower that lasts for seven days (Newcomb, 1977) (USFWS, 2008b). One distinct feature of this species is that it can remain dormant underground for 10 to 20 years before reappearing (USFWS, 1992). Current threats to small whorled pogonia include habitat loss due to urban expansion and forestry practices (USFWS, 2008b).

11.1.7 Land Use, Recreation, and Airspace

11.1.7.1 Definition of the Resource

The following summarizes major land uses, recreational venues, and airspace considerations in New York, characterizing existing, baseline conditions for use in evaluating the potential environmental consequences resulting from implementing the Proposed Action or Alternatives.

Small whorled pogonia Photo credit: USFWS

Land Use and Recreation

Land use is defined as "the arrangements, activities, and inputs people undertake in a certain land cover type to produce, change, or maintain it" (Di Gregorio & Jansen, 1998). A land use designation can include one or more pieces of land, and multiple land uses may occur on the same piece of land. Land use also includes the physical cover, observed on the ground or remote sensing and mapping, on the earth's surface; land cover includes vegetation and manmade development (USGS, 2012b).

Recreational uses are activities in which residents and visitors participate. They include outdoor activities, such as hiking, fishing, boating, athletic events (e.g., golf), and other attractions (e.g., historic monuments and cultural sites) or indoor activities, such as museums and historic sites. Recreational resources can include trails, caves, lakes, forests, beaches, recreational facilities, museums, historic sites, and other areas/facilities. Recreational resources are typically managed by federal, state, county, or local governments.

Descriptions of land uses are presented in three primary categories: forest and woodlands, agricultural, and developed. Descriptions of land ownership are presented in four main categories: private, federal, state, and tribal. Descriptions of recreational opportunities are presented in a regional fashion, highlighting areas of recreational significance within 12 identified regions.

Airspace

Airspace is generally defined as the space lying above the earth, above a certain area of land or water, or above a nation and the territories that it controls, including territorial waters (Merriam Webster Dictionary, 2015). Airspace is a finite resource that can be defined vertically and horizontally, as well as temporally, when discussing it in relation to aircraft activities. Airspace management addresses how and in what airspace aircraft fly. Air flight safety considers aircraft flight risks, such as aircraft mishaps and bird/animal-aircraft strikes. The FAA is charged with the safe and efficient use of the nation's airspace and has established criteria and limits to its use.

The FAA operates a network of airport towers, air route traffic control centers, and flight service stations. The FAA also develops air traffic rules, assigns use of airspace, and controls air traffic in U.S. airspace. "The Air Traffic Organization (ATO) is the operational arm of the FAA responsible for providing safe and efficient air navigation services to approximately 30.2 million square miles of airspace. This represents more than 17 percent of the world's airspace and includes all of the U.S. and large portions of the Atlantic and Pacific Oceans and the Gulf of Mexico" (FAA, 2014a). The ATO is comprised of Service Units (organizations) that support the operational requirements.

The FAA Air Traffic Services Unit (the Unit) manages the National Airspace System (NAS) and international airspace assigned to U.S. control and is responsible for ensuring efficient use, security, and safety of the nation's airspace. FAA field and regional offices (e.g., Aircraft Certification Offices, Airports Regional Offices, Flight Standards District Offices [FSDOs], Regional Offices and Aeronautical Center, etc.) assist in regulating civil aviation to promote safety, and develop and carry out programs that control aircraft noise and other environmental effects (e.g., air pollutants) attributed from civil aviation (FAA, 2015b). The FAA works with state aviation officials and airport planners, military airspace managers, and other organizations in deciding how best to use airspace.

11.1.7.2 Specific Regulatory Considerations

Appendix C summarizes numerous federal environmental laws and regulations that, to one degree or another, may affect land use in New York. However, most site-specific land use controls and requirements are governed by local county, city, and village laws and regulations. Furthermore, many land use controls and requirements are implemented and enforced under the umbrella of land use planning, often with the help and support of state authorities. The Guide to Planning and Zoning Laws of New York (New York State Department of State, 2011) is the current state-level guidance for land use planning in New York.

Because the nation's airspace is governed by federal laws, there are no specific New York state laws that would alter the existing conditions relating to airspace for this PEIS.

11.1.7.3 Land Use and Ownership

For the purposes of this analysis, New York has been classified into three primary land use groups: forest and woodlands,[145] agricultural,[146] and developed land.[147] Land ownership within New York has been classified into four main categories: private, federal, state, and tribal.

Land Use

Table 11.1.7-1 identifies the major land uses in New York. Forest and woodlands comprises the largest portion of land use with 63 percent of New York's total land occupied by this category (Table 11.1.7-1 and Figure 11.1.7-1). Agriculture is the second largest area of land use with 23 percent of the total land area. Developed areas account for approximately 8 percent of the total land area (USGS, 2012c). The remaining percentage of land includes public land and other land covers, shown in Figure 11.1.7-1, that are not associated with specific land uses. (USGS, 2012c)

Land Use	Square Miles	Percent of Land
Forest and Woodland	30,502	63.0%
Agricultural Land	10,902	23.0%
Developed Land	3,916	8.0%

Table 11.1.7-1: Major Land Uses in New York

Source: (USGS, 2012c)

Forest and Woodland

Forest and woodland areas can be found throughout the state, many of them interspersed with, and adjacent to, agricultural areas. The two largest concentrations of forest are in the Adirondack (9,096 square miles) and Catskill (1,102 square miles) State Parks, which are managed by the state with mixed ownership by the federal government, state government, and private land owners. Most forest and woodland areas throughout New York are privately owned (approximately 74 percent) (Adirondack Park Agency, 2014) (NYSDEC, 2008). Section 11.1.6.3, Terrestrial Vegetation, presents additional information about terrestrial vegetation.

State Forest Preserves and Detached Forest Preserves

New York forest preserve lands are comprised of the Adirondack Forest Preserve (approximately 4,062 square miles) and the Catskill Forest Preserve (approximately 453 square miles). State

[145] Forest and woodlands: Areas characterized by tree cover (natural or semi-natural woody vegetation, generally greater than 6 meters tall); tree canopy accounts for 25-100 percent of the cover. (USGS, 2012c)
[146] Agricultural: Areas characterized by herbaceous vegetation that has been planted or is intensively managed for the production of food, feed, or fiber; or is maintained in developed settings for specific purposes. Herbaceous vegetation accounts for 75-100 percent of the cover. (USGS, 2012c)
[147] Developed: Areas characterized by a high percentage (30 percent or greater) of constructed materials (e.g., asphalt, concrete, buildings, etc.). (USGS, 2012c)

forest preserves are protected under Article XIV of the New York State Constitution as "forever wild" given they have "exceptional scenic, recreational, and ecological value" (NYSDEC, 2015bv). State forest preserves protect close to 2,000 miles of hiking trails over millions of acres of unfragmented forests.

Detached forest preserve parcels are "classified as Forest Preserve but outside the Catskill and Adirondack Park boundaries" (NYSDEC, 2015bv). These parcels are generally located in close proximity to the Adirondack and Catskill Parks but are fragmented by surrounding private land. Ranging in size from 0.5 to 739 acres, detached forest preserve lands are owned and managed by the state for wildlife habitat and watershed protection. Although they contain timber resources, they are not managed for timber production and have relatively poor access with no developed trails or facilities (NYSDEC, 2015bv).

State Forests

State Forests account for 1,230 square miles of state land and are comprised of forest lands located outside the Forest Preserves (NYSDEC, 2015bw). State Forests are under the administration of and managed by the Division of Lands and Forests. The 2011 Strategic Plan for State Forest Management states that these lands "are managed under public ownership by professional foresters; allow for the sustainable use of natural resources; are open to recreational use; provide watershed protection; and cover large land areas throughout the state" (NYSDEC, 2015bv). State Forests have been "set aside to offset widespread trends of agricultural

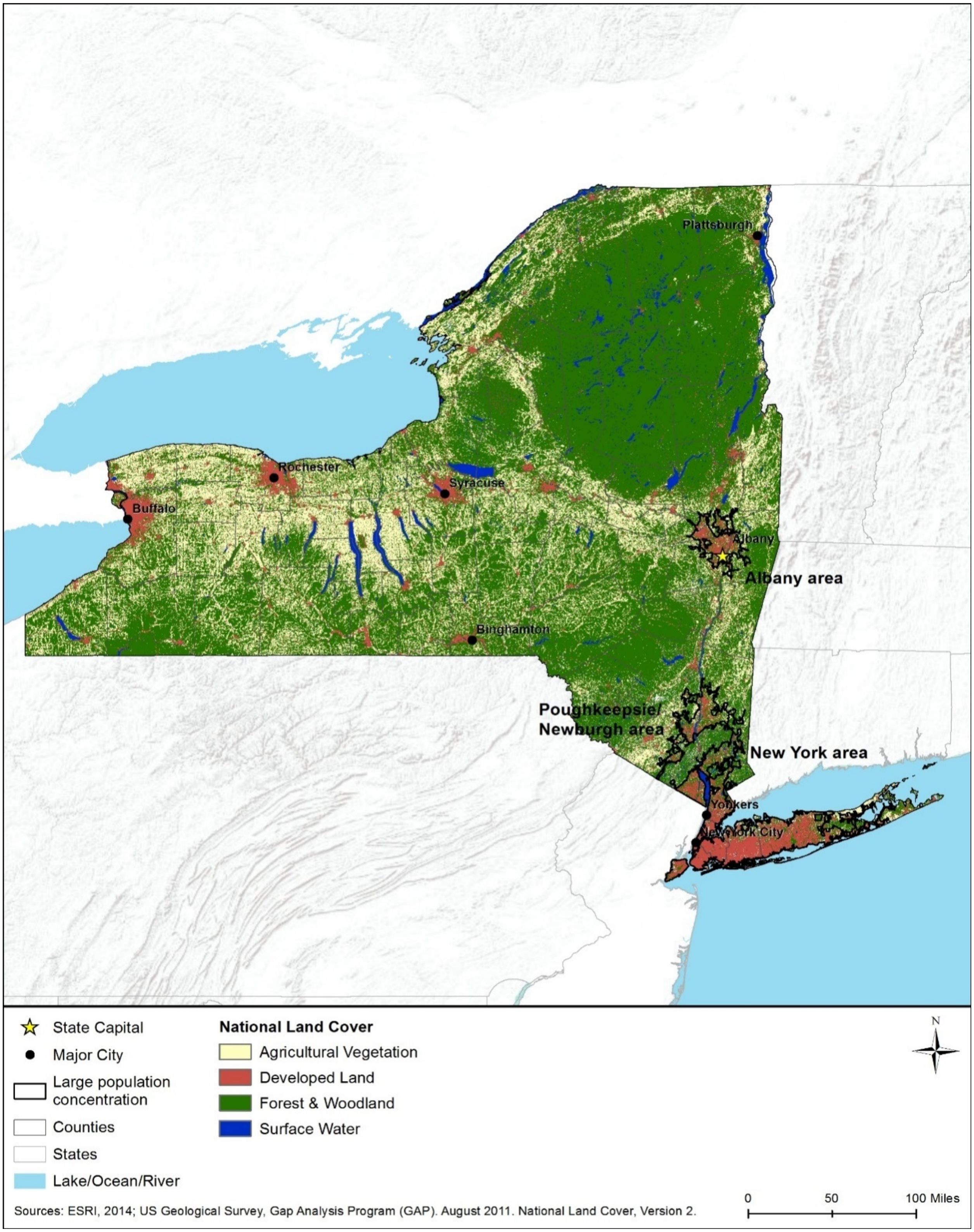

Figure 11.1.7-1: Land Use Distribution

abandonment and deforestation and restore the land's ability to support vegetation" (NYSDEC, 2015bw).

Private Forest and Woodland

Approximately 21,875 square miles, or 74 percent of New York's total forestland, is owned collectively by nearly 700,000 private landowners. Private forestlands indirectly provide some public benefit, including forest products, wildlife habitat, jobs, scenic beauty, and outdoor recreation opportunities (NYSDEC, 2015bx). Scattered throughout the state, forests and woodlands on private lands often border agricultural fields, suburban neighborhoods, and State Forest Preserves. For additional information regarding forest and woodland areas, see Section 11.1.6, Biological Resources and Section 11.1.8, Visual Resources.

Agricultural Land

Agricultural land exists in every region of the state, with the largest concentrations in the Finger Lakes area and across the center of the state (Figure 11.1.7-1). Almost one-quarter of New York's total land area is classified as agricultural land (approximately 23 percent, or 10,902 square miles). In 2012, there were 35,537 farms in New York and most were owned and operated by small, family businesses, with the average farm size of less than 200 acres (USDA, 2012). Some of the state's largest agricultural uses include dairy, fruits, berries, wine, and vegetables. Other agricultural uses include livestock for dairy and meat, goats, sheep and hogs (State of New York, 2010). For more information on field crops, irrigation, and market values by county, access the USDA Census of Agriculture website: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Census_by_State/New_York/.

Developed Land

Developed land in New York tends to be concentrated within major metropolitan areas and surrounding cities, towns, and suburbs (Figure 11.1.7-1). Although only 8 percent of New York land is developed, these areas are highly utilized for residential, commercial, industrial, recreational, and government purposes. Table 11.1.7-2 lists the top five developed metropolitan areas within the state and their associated population estimates; Figure 11.1.7-1 shows where these areas are located within the Developed land use category.

Table 11.1.7-2: Top Five Developed Metropolitan Areas

Metropolitan Area	Population Estimate
New York City-Long Island-Lower Hudson Valley	12,563,932
Albany-Schenectady-Troy	880,167
Buffalo-Cheektowaga-Niagara Falls	1,136,360
Rochester	1,083,393
Syracuse	661,478
Total Population of Metropolitan Areas	16,325,330
Total State Population	19,746,227

Source: (U.S. Census Bureau, 2015a)

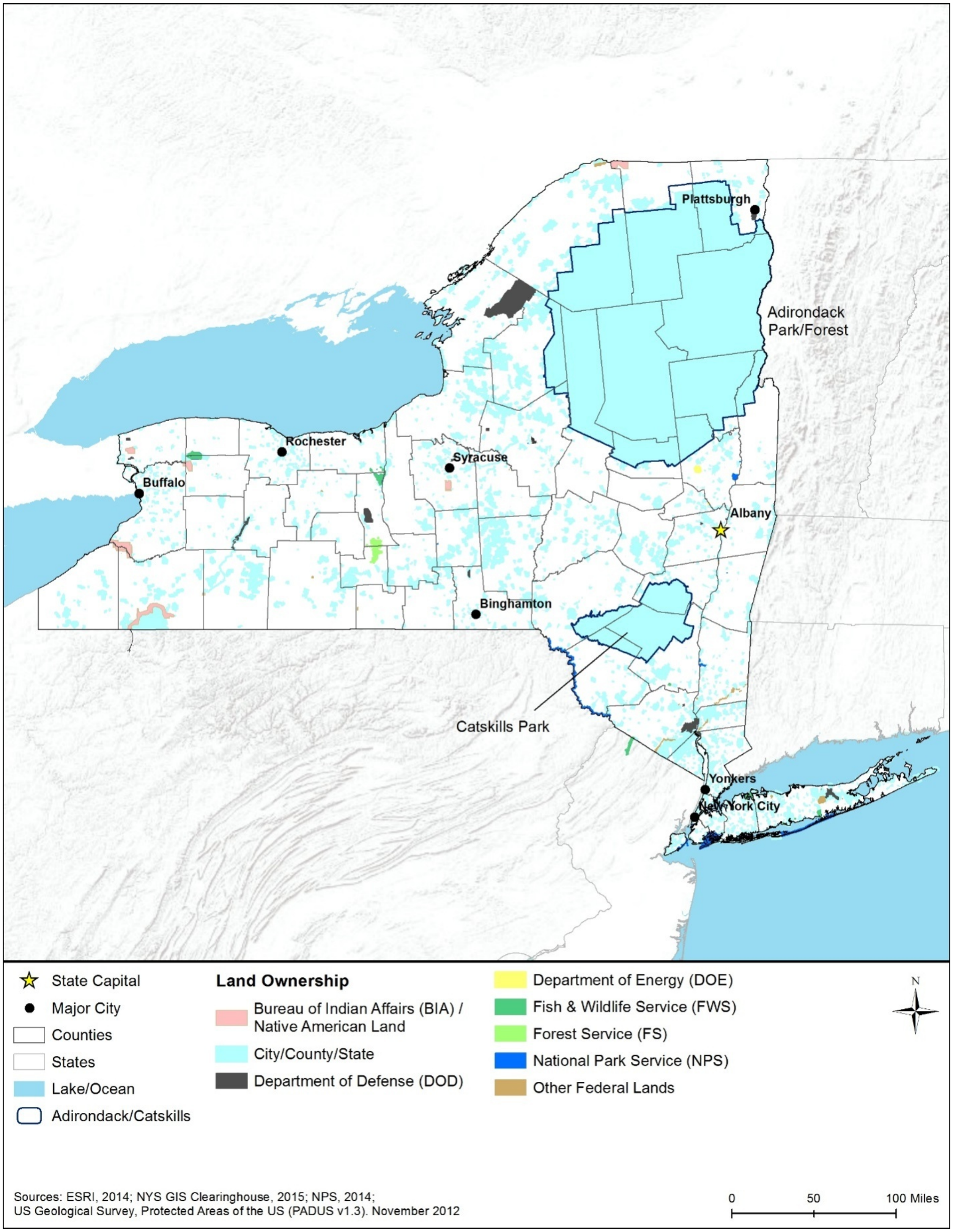

Figure 11.1.7-2: Land Ownership Distribution

Land Ownership

Land ownership within New York has been classified into four main categories: private, federal, state, and tribal. Figure 11.1.7-2 illustrates land ownership in New York.

Private Land

The majority of land in New York is privately owned, with most of this land falling under the land use categories of agricultural, forest and woodland, and developed (Figure 11.1.7-1). Highly developed, urban, metropolitan areas transition into suburban, agriculture, shrub, and woodland areas, which then transition into more wild and remote areas. Private land exists in all regions of the state, including within the Adirondack and Catskill State Parks.[148]

Federal Land

The federal government manages 398 square miles (less than 1 percent) of New York land with a variety of land types and uses, including national parks, monuments, historic sites, military bases, and national forests. Five federal agencies manage federal lands throughout the state (Figure 11.1.7-2). Table 11.1.7-3 identifies the federal agencies managing federal lands throughout the state. Some federal agencies only have small areas of federal lands scattered throughout the state.[149] Additional information on lands managed by federal agencies is provided in Section 3.1.5, Wetlands, and Section 3.1.8, Visual Resources.

Table 11.1.7-3: Federal Land in New York

Agency[a]	Square Miles	Representative Type
Department of Energy	19	National Laboratories
Department of Defense	274	Military Bases
USFWS	43	Wilderness Areas
USDA Forest Service (USFS)	32	Wilderness and Forest Areas
National Park Service[b]	30	Parks, Monuments, Historic Sites
Total	**398**	

Sources: (USGS, 2012d); (USGS, 2014l)

[a] Table identifies land wholly managed by the agency; additional properties may be managed by or affiliated with the agency.

[b] Additional trails and corridors pass through Connecticut that are part of the National Park System.

- The Department of Energy owns and manages 19 square miles divided between two national laboratories: The Brookhaven National Laboratory (12.5 square miles) and the West Milton Area Knolls Atomic Power Laboratory (6.5 square miles);
- The Department of Defense owns and manages 274 square miles used for military bases, forts, military academies, military training centers, and test areas;
- The USFWS owns and manages 43 square miles consisting of 10 National Wildlife Refuges in New York, with seven located within the Long Island National Wildlife Refuge Complex;
- The USDA Forest Service (USFS) owns and manages 32 square miles set aside as the Finger Lakes National Forest; and

[148] Total acreage of private land could not be obtained for the state.

[149] Not all federal agency land is depicted in Figure 11.1.7-2 given the small size of some of the land acreage.

- The National Park Service (NPS) manages 30 square miles consisting of 22 National Park units, one National Recreation Area (Gateway National Recreation Area), and one National Seashore (Fire Island National Seashore). See Section 11.1.8, Visual Resources, for more information on the National Park units in New York.

State Land

The New York state government owns approximately 7,800 square miles of land comprised of forests and woodlands, historic sites, state offices, and recreation areas. Two main state agencies, the NYSDEC and the Office of Parks, Recreation and Historic Preservation, manage 99 percent of state lands (Table 11.1.7-4). These agencies are also responsible for managing larger tracts of land of mixed ownership; for example, and as discussed in previous sections, the Adirondack (9,096 square miles) and Catskill (1,102 square miles) State Parks, which are managed by the state with mixed ownership by federal and state government, and private land owners. (NYSDEC, 2015bw).

Table 11.1.7-4: State Land in New York

Agency	Square Miles	Type
NYSDEC	7,187	State Forests, Forest Preserves, Conservation Easements, Wildlife Management Areas
Office of Parks, Recreation and Historic Preservation	546	Parks, Recreation Areas, Historic Sites
Other	78	Miscellaneous
Total	7,800	NA

Source: (NYSDEC, 2015bw).

- The NYSDEC manages two Forest Preserves: the Adirondack Forest Preserve (approximately 4,062 square miles) and the Catskill Forest Preserve (approximately 453 square miles, Figure 11.1.7-2) (NYSDEC, 2000). In addition, the NYSDEC manages Wildlife Management Areas (WMAs), lands acquired primarily for the production and use of wildlife, including research on wildlife species and habitat management. WMAs are under the control and management of the NYSDEC Division of Fish, Wildlife, and Marine Resources. There are more than 85 WMAs covering more than 312 square miles scattered throughout the state (NYSDEC, 2015by). For additional information on wildlife refuges and management areas, see Section 11.1.6.4, Wildlife.
- The Office of Parks, Recreation, and Historic Preservation manages 20 state heritage areas throughout the state in rural and metropolitan urban areas (New York Office of Parks, Recreation, and Historic Preservation, 2015b). Examples of heritage areas include the Lake Erie Concord Grape Belt, the New York City Harbor Park, and the town of Seneca Falls. For additional information regarding these properties and resources, see Section 11.1.11, Cultural Resources. In addition, the New York State Historic Preservation Office maintains an online property database at https://cris.parks.ny.gov/ffLogin.aspx?ReturnUrl=%2f. State parks contain natural, historic, cultural, and/or recreational resources of significance to New York residents and visitors. There are 179 state parks throughout New York (Figure 11.1.7-2) (NYSDEC, 2015bv).

Tribal Land

The Bureau of Indian Affairs, along with individual tribes, manages 160 square miles, or 0.3 percent of the total land within New York. These lands are composed of 10 Indian Reservations located throughout the state (Figure 11.1.7-2 and Table 11.1.7-5). For additional information regarding tribal land, see Section 11.1.11, Cultural Resources.

Table 11.1.7-5: Indian Reservations of New York

Reservation Name	Square Miles
Allegany Indian Reservation	41.6
Cattaraugus Indian Reservation	41.9
Oil Springs Indian Reservation	1.6
Oneida Indian Reservation	20.3
Onondaga Indian Reservation	11.5
Poospatuck Indian Reservation	0.086
Saint Regis Indian Reservation	18.9
Shinnecock Indian Reservation	1.3
Tonawanda Indian Reservation	13.1
Tuscarora Indian Reservation	9.7
Total	159.9

Sources: (USGS, 2012d)

11.1.7.4 Recreation

New York is a diverse state, with areas vastly varying in population density, community affluence, and cultural interests. On the community level, towns, cities, and counties provide an assortment of indoor and outdoor recreational facilities, including athletic fields and courts, playgrounds, picnicking areas, indoor and outdoor pools, and dog parks. Availability of community-level facilities is typically commensurate to the population's needs. For example, New York City provides over 50 recreation centers, field houses, dance and art studios, libraries, and community centers for its high volume of residents (New York City Department of Parks and Recreation, 2015). In comparison, centrally located Madison County, with few densely populated areas, oversees two parks with recreational amenities, but has established four trails themed for the cultural and historic events that occurred in the county, as well as a county-sponsored project to preserve barns and rekindle the 1930's art of barn painting (Madison County, 2015) (Madison County, 2014).

This section discusses recreational opportunities available at various locations throughout New York. The New York Department of Parks and Recreation categorizes the state by 12 distinct recreational regions, each of which are presented in the following sub-sections. For information on visual resources, see section 11.1.8, Visual Resources, and for information on the historical significance of locations, see section 11.1.14, Cultural Resources.

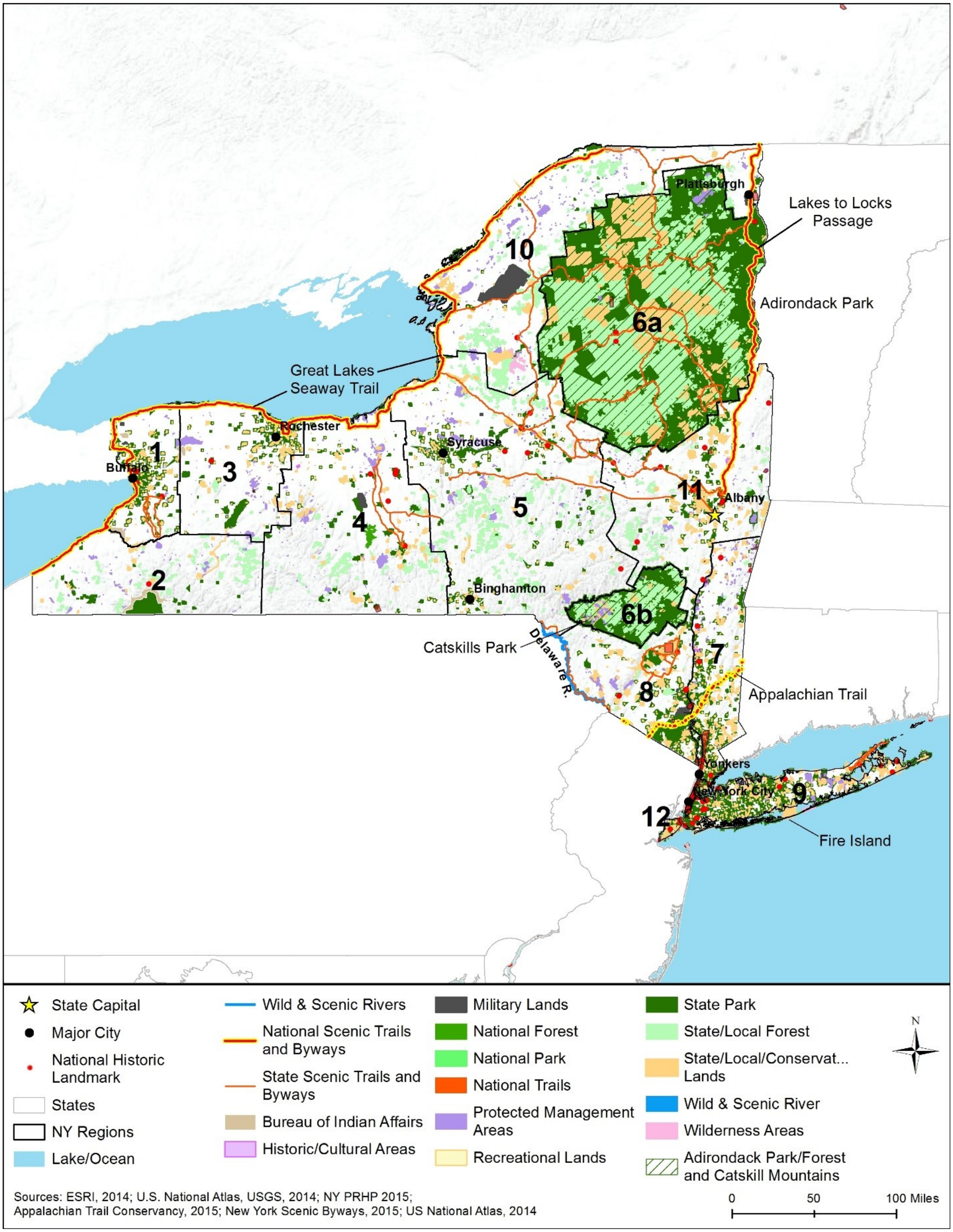

Figure 11.1.7-3: New York Recreation Resources

Region 1

Region 1 is located in the western part of the state (Figure 11.1.7-3), and is bordered by Lake Erie and the Niagara River to the west, Lake Ontario to the north, Region 3 to the east and Region 2 to the south. This region is known for the Niagara Falls and the Niagara Falls State Park, which receives more annual visitors than the Grand Canyon and Yosemite National Parks combined (New York Office of Parks, Recreation, and Historic Preservation, 2015c).

The majority of New York state parks are adjacent to the two Great Lakes and the Niagara River bordering Region 1; recreation in this region is dominated by lakeside activities including camping, boating, and fishing (New York Office of Parks, Recreation, and Historic Preservation, 2015d). Niagara Gorge trails wind through two state parks (New York Office of Parks, Recreation, and Historic Preservation, 2015d), and the Great Lakes Seaway Trail is a scenic driving route that follows the water border of this region (Great Lakes Seway Trail, 2015).

Region 2

Region 2 is in western New York (Figure 11.1.7-3) and is bordered by Pennsylvania and Lake Erie to the west, Regions 1 and 3 to the north, Region 4 to the east, and Pennsylvania to the south. Region 2 is home to the Allegany State Park, known for attracting outdoor aficionados. The park has over 400 campsites as well as year-round camping facilities at two developed sites (New York Office of Parks, Recreation, and Historic Preservation, 2015e). The Lake Erie State Park also is located in Region 2, and has cabins with access to the shoreline of Lake Erie, combining camping activities with lake activities. Birdwatching is also popular within the park during migrating season, different varieties of birds can be viewed flying across Lake Erie (New York State Parks, 2015).

Region 3

Region 3, in western New York (Figure 11.1.7-3), is bordered to the west by Region 1, Lake Ontario to the North, Region 4 and the Canandiagua Lake to the east, and Region 2 to the south. Recreation in Region 3 is defined by areas on the Lake Ontario border, the swamps of western New York, and by the Genesee River flowing through the center of the region.

Four state parks located on the shore of Lake Ontario provide beaches, boat access, and fishing (New York Office of Parks, Recreation, and Historic Preservation, 2015f). The Iroquois National Wildlife Refuge is a swampy area spanning Genesee and Orleans Counties. Known for its wildlife, the refuge is used for birdwatching, photography, hunting, and fishing (USFWS, 2014c). The Genesee River flows through Letchworth State Park, the "Grand Canyon of the East," with major waterfalls, trails, river sports such as kayaking, and winter sports including cross-country skiing (New York Office of Parks, Recreation, and Historic Preservation, 2015g).

Region 4

Region 4 is composed of the Finger Lakes counties in central New York (Figure 11.1.7-3). It is bordered by Regions 2 and 3 to the west, Lake Ontario to the north, and Region 5 and the Cayuga Lake to the east. The Finger Lakes National Forest, between Seneca and Cayuga Lakes, hosts camping, hiking, and winter sports such as cross-country skiing and snowmobiling (USFS, 2015b). Eleven state parks are located directly on one of the Finger Lakes, six state parks contain gorges with waterfalls, and one state park, Taughannock Falls, has both lakefront and waterfalls. These parks have natural pools for swimming, hiking, camping, and other recreational activities (New York Office of Parks, Recreation, and Historic Preservation, 2015h). The Finger Lakes wine region has 136 wineries and tasting rooms, and is a growing industry providing tours, tastings, and tourist destinations (New York Wines, 2015).

Region 5

Region 5 is located in central New York (Figure 11.1.7-3), bordered to the west by Region 4, to the north by Lake Ontario and Region 10, to the east by the Adirondack Park and Region 11, and to the south by the Catskills, Region 8, and Pennsylvania. A small portion of Oneida County lies within the boundary of the Adirondack Park, Region 6a, and a portion of Delaware County lies within the boundary of the Catskill Park, Region 6b. Region 5 is one of the largest New York regions, and contains 20 state parks and 7 state historic sites.

Gilbert Lake State Park, the region's "wildlife park," has a lake and three ponds for water-related recreation, as well as 12 miles of interconnecting trails with multi-season use. Green Lakes State Park, visited by 1 million people annually with a lake beach, 17 miles of trails, and a golf course (New York Office of Parks, Recreation, and Historic Preservation, 2015i).

Two recreation areas created by dams are also located in Region 5: East Sidney Dam and Whitney Point. These areas host water-related recreational opportunities (USACE, 2015)

Region 6A

Region 6a is the Adirondack State Park, the largest publicly protected area in the contiguous U.S. The park consists of 9,096 square miles, half of which belongs to the state and half of which is private land (APA, 2015a). It is surrounded by Regions 5, 10, and 11, and Vermont (Figure 11.1.7-3). The Adirondacks are generally known for outdoor recreation, in particular seasonal activities.

Summer activities in the Adirondacks are widely varied. Catering to "laid back adventurers," the park hosts bike festivals, canoe, and kayak paddling contests, movies and plays, and many other events. The Adirondacks' navigable waters make it a unique recreational destination among mountainous regions; summer in the Adirondacks has boating, fishing, and swimming (Adirondack Regional Tourism Council, 2015a).

Most of the state's winter resorts also are located in the Adirondacks. Much of the area specializes in downhill skiing, although cross-country skiing, snowmobiling, and snowshoeing are also prevalent. The Snow Ridge Ski area has the "East's heaviest snowfall," Whiteface Mountain has the east's greatest vertical drop, and Titus Mountain skiers focus on speed (Adirondack Regional Tourism Council, 2015b). New York resorts partner with local businesses and city and county governments to host a variety of events, including Lake George's Winter Carnival, Lake Placid's Empire State Winter Games, and Fulton's Great Eastern Whiteout.

Whiteface Mountain, the highest peak in New York, was the site of the 1932 and 1980 Winter Olympics, and the Lake Placid Olympic Center remains open (I Love NY, 2015).

Region 6B

Region 6b is the Catskill Mountains Natural Areas, which includes the Catskill State Park, in southeastern New York. Region 6b is surrounded by Regions 5, 11, 7, and 8 (Figure 11.1.7-3). The Catskill Forest Preserve is a defined area within the Catskill State Park, a combination of public and private lands. The economic status of the area surrounding the mountains is supported by the tourism and recreation industries. Within the state park, outdoor recreational opportunities are available, including camping, hunting, rock climbing, and snowmobiling. Five fire towers, observation towers to watch for signs of forest fires that were phased out of use in the 1980s, have been restored and are popular tour sites.

Region 7

Region 7, along the eastern border of the state, (Figure 11.1.7-3) is bordered by the Hudson River and the Catskill Mountains Natural Areas to the west, Region 11 to the north, Massachusetts and Connecticut to the east, and New York City to the south. Region 7 is known as the Great Estates Region, with 12 federal, state, and private historic manors within 40 miles along the Hudson River, attracting over 1.7 million tourists annually. These great estates provide tours of the homes and the surrounding gardens and lands, driving the tourist industry within Region 7 (Urbanomics, Inc., 2014).

The Walkway Over the Hudson State Historic Park holds the title of being the world's longest elevated pedestrian bridge. The bridge has become a popular destination; over 40,000 people attended the bridge's 2009 opening weekend festivities (New York Office of Parks, Recreation, and Historic Preservation, 2015j). The Appalachian Trail, entering Region 7 from Connecticut, continues into Region 8 on the 88.4 mile path through New York. In Regions 7 and 8, the trail difficulty is posted as Rating 8, which includes rock scrambling that is somewhat challenging (Appalachian Trail Conservancy, 2015).

Region 8

Region 8 is located in the southern part of New York, and is bordered to the west by Pennsylvania and the Delaware River, to the north by Regions 5 and 11 and the Catskill Mountains Natural Areas, and to the east by the Hudson River and Region 7 (Figure 11.1.7-3). Recreation in Region 8 is focused on river activities: the region is bordered by both the Hudson River and the Delaware River, a wild and scenic river, and contains several lakes with recreational opportunities. Fishing, boating, and swimming are popular at state parks within the region. The first segment of the Appalachian Trail is located in this region, and is counted among the over 200 miles of trails located in Harriman State Park (New York Office of Parks, Recreation, and Historic Preservation, 2015k).

Region 9

Region 9 is composed of Nassau and Suffolk Counties on Long Island (Figure 11.1.7-3), bordering New York City to the west, Long Island Sound to the north, Block Island Sound to the east, and the Atlantic Ocean to the south. According to the NYSPRHP's website (New York Office of Parks, Recreation, and Historic Preservation, 2015l), “Long Island's 20 state parks and historic sites attract nearly 20 million visitors annually.” With close proximity to shorelines and waterways, many of the region's recreational resources are water-related venues and activities, including large beaches near New York City. Belmont Park, a horse racing venue whose most famous race is the Belmont Stakes, the third jewel of the Triple Crown, is located in Elmont in Nassau County (New York Racing Association, 2015a). The region also contains the Hamptons, which is comprised of large, privately owned estates and tracts of land.

On the South Shore, Jones Beach State Park, Fire Island National Seashore, and the beaches of the Hamptons have a wide range of built and natural infrastructure that support recreational services, including boardwalks nature trails, concert facilities, marinas, and miles of sandy beaches (New York Office of Parks, Recreation, and Historic Preservation, 2015m) (NPS, 2015d). Inside the South Shore barrier islands are the shallow waters of Great South Bay, Moriches Bay, and Shinnecock Bay, with areas for recreational fishing and boating of all types. Compared to the South Shore, the North Shore recreational facilities are fewer, partly due to the narrower beaches and less public access, with large coastal estates of the "Gold Coast" on the western end of the island, and more remote and rocky coasts on the eastern part of the North Shore. Recreational activities on the East End are dominated by the services and venues in and near the Peconic Bays and Gardiners Bay, including sailing and fishing in the open waters, canoeing and kayaking in the coastal marshes and inlets, and camping and hiking at Montauk State Park. The town of Montauk, at the eastern most point of the state, has a large marina, a state park, and a historic lighthouse that serves visitors and recreation enthusiasts from throughout the state and beyond (New York Office of Parks, Recreation, and Historic Preservation, 2015l).

Region 10

Region 10, the northernmost region in New York (Figure 11.1.7-3), is bordered by Lake Ontario, the St. Lawrence River, Lake Champlain, Vermont, and to the south, the Adirondack State Park. Thirty state parks, one historic site, and six boat launches are located within Region 10. Southwick Beach State Park on the shore of Lake Ontario is known for its freshwater sand beach. Wellesley Island State Park is the largest park in the region, and has cabins for year-round camping, a marina, and a golf course. On the shore of Lake Champlain, Cumberland Bay State Park has 2,700 feet of beach (New York Office of Parks, Recreation, and Historic Preservation, 2015n). Region 10 is also home to a great stretch of the Great Lakes Seaway Trail, a scenic driving route that follows the shore of Lake Ontario, the Niagara River, and Lake Erie across New York into Pennsylvania (Great Lakes Seway Trail, 2015).

Region 11

Region 11 is the Capital District, bordered by Region 5 to the west, the Adirondack State Park to the north, Vermont and Massachusetts to the east, and Region 7 and the Catskills to the south (Figure 11.1.7-3). Region 11 is home to 11 state parks, providing activities such as hiking and swimming during summer months and skiing and ice skating in winter months (New York Office of Parks, Recreation, and Historic Preservation, 2015o). Most of the parks and historic sites in this region take part in the annual Saratoga-Capital District Region Geocache Challenge, a contest to find 60 hidden locations within the parks using only a handheld global positioning system (New York Office of Parks, Recreation, and Historic Preservation, 2015p). The Saratoga Spa State Park is known for the mineral baths, the Peerlees Pool Complex, and its championship golf course (New York Office of Parks, Recreation, and Historic Preservation, 2015q). The Saratoga Racetrack in Saratoga Springs is the oldest sporting venue in the U.S., and has a capacity for 50,000 attendees (New York Racing Association, 2015b) The Saratoga National Historic Park memorializes the Battle of Saratoga, the park provides guided walking and bicycle tours of the historic battlefield, as well as children's programs (NPS, 2015e).

Region 12

Region 12 is New York City at the southern tip of the state, consisting of Richmond, New York, Kings, Queens, and Bronx Counties, referred to as boroughs (Figure 11.1.7-3). New York City is the most population-dense area in the U.S. (Department of City Planning City of New York, 2014). It consists of three islands located at the mouth of the Hudson River, Manhattan, Staten Island, and a portion of Long Island. New York City is bordered by the Hudson River and the Upper New York Bay to the west; Region 7 to the north; the East River, Block Island Sound, Region 9, and the remainder of Long Island to the east; and the Atlantic Ocean and the Lower New York Bay to the south.

New York City is known for its built recreation, including sports venues, Broadway shows, and museums (New York Office of Parks, Recreation, and Historic Preservation, 2015r). Located in the middle of Manhattan, Central Park's 1.3 square miles is visited by over 40 million people annually, making it the most visited urban park in the U.S. (Central Park Conservancy, 2014a) (Central Park Conservancy, 2014b). Included in Central Park are the calliope carousel and the Central Park Zoo (Central Park Conservancy, 2014c). Eight state parks are located in New York City, including the Clay Pit Ponds Preserve, one of the only areas within New York City that provides horseback riding (New York Office of Parks, Recreation, and Historic Preservation, 2015r). The Gateway National Recreation Area was visited by over six million patrons in 2014, using facilities such as beaches, playgrounds, and campgrounds (NPS, 2015f) (NPS, 2015g) (NPS, 2015h).

11.1.7.5 Airspace

The FAA uses the NAS to provide for aviation safety. The NAS includes Special Use Airspace (SUA) consisting of Restricted Areas, Warning Areas, and Military Operation Areas (MOA). The FAA controls the use of the NAS with various procedures and practices (such as established flight rules and regulations, airspace management actions, and air traffic control procedures) to ensure the safety of aircraft and protection of the public.

Airspace Categories

There are two categories of airspace or airspace areas:

1) Regulatory airspace consists of controlled airspace (Class A, B, C, D, and E airspace areas in descending order of restrictive operating rules), and restricted and prohibited areas.
2) Non-regulatory airspace consists of MOAs, warning areas, alert areas, and controlled firing areas.

Within each of these two categories, there are four types of airspace: controlled, uncontrolled, special use, and other airspace. The categories and types of airspace are dictated by the complexity or density of aircraft movements, the nature of the operations conducted within the airspace, the level of safety required, and the national and public interest. Figure 11.1.7-4 depicts the different classifications and dimensions for controlled airspace. Air Traffic Control (ATC)[150] service is based on the airspace classification (FAA, 2008).

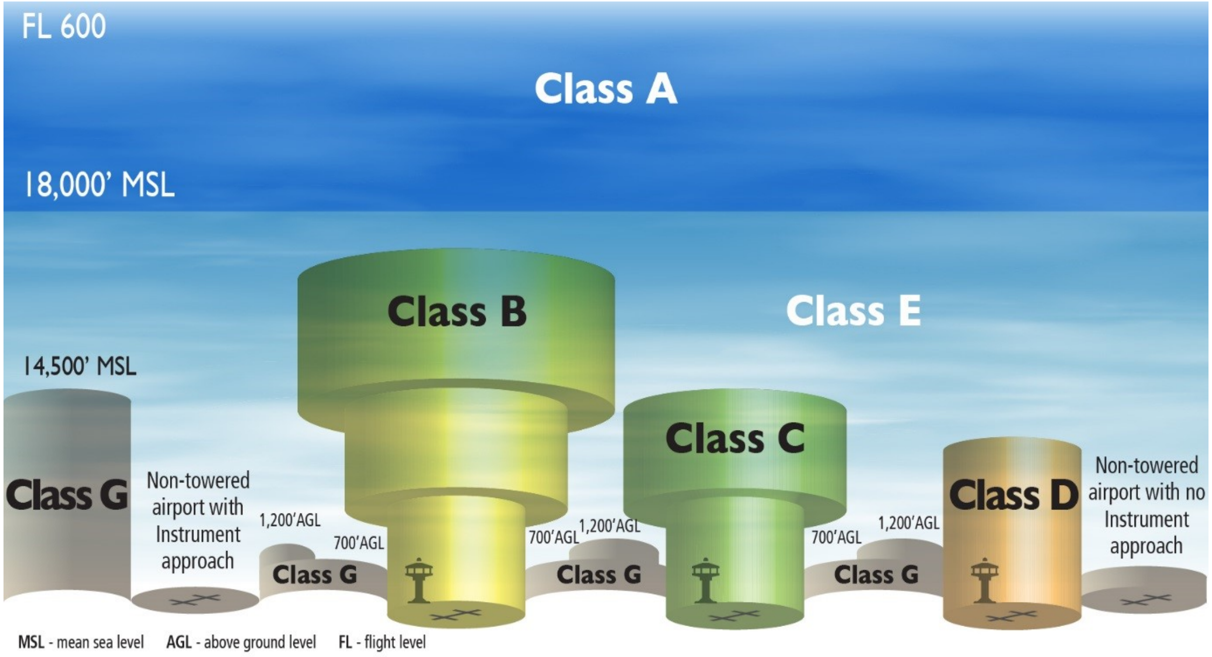

Figure 11.1.7-4: National Air Space Classification Profile

Source: Derived from (FAA, 2008)

150 ATC – Approved authority service to provide safe, orderly, and expeditious flow of air traffic operations (FAA, 2015c)

Controlled Airspace

- **Class A:** Airspace from 18,000 feet to 60,000 feet Mean Sea Level (MSL)[151]. Includes the airspace over waters off the U.S. coastlines (48 contiguous States and Alaska) within 12 Nautical Miles (NM). All operations must be conducted under Instrument Flight Rules (IFR).[152]
- **Class B:** Airspace from the surface up to 10,000 feet MSL near the busiest airports with heavy traffic operations. The airspace is tailored to the specific airport in several layers. An ATC clearance is required for all aircraft to operate in this area.
- **Class C:** Airspace from the surface to 4,000 feet above the airport elevation surrounding the airport. Applies to airports with an operational control tower, serviced by a radar approach control, and certain number of IFR operations or total number of passengers boarding aircrafts. Airspace is tailored in layers, but usually extends out to 10 NM from 1,200 feet to 4,000 feet above the airport elevation. Entering Class C airspace requires radio contact with the controlling ATC authority, and an ATC clearance is ultimately required for landing.
- **Class D:** Airspace from the surface to 2,500 feet above the airport elevation surrounding airports with an operational control tower. Airspace area is tailored. Aircraft entering the airspace must establish and maintain radio contact with the controlling ATC.
- **Class E:** Controlled airspace not designated as Class A, B, C, or D. Class E airspace extends upward from the surface or a designated altitude to the overlying or adjacent controlled airspace (FAA, 2008).

Uncontrolled Airspace

Class G: No specific definition. Refers generally to airspace not designated as Class A, B, C, D, or E. Class G airspace is from the surface to the base of Class E airspace.

Special Use Airspace

SUA designates specific airspace that confines or imposes limitations on aircraft activities (Table 11.1.7-6).

Table 11.1.7-6: SUA Designations

SUA Type	Definition
Prohibited Areas	"Airspace of defined dimensions identified by an area on the surface of the earth within which the flight of aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare. These areas are published in the Federal Register and are depicted on aeronautical charts."
Restricted Areas	"Airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency

[151] MSL – The average level of for the surface of the ocean; "The height of the surface of the sea midway between the average high and low tides." (Merriam Webster Dictionary, 2015)
[152] IFR – Rules for the conduct of flights under instrument meteorological conditions. (FAA, 2015d).

SUA Type	Definition
	may be extremely hazardous to the aircraft and its occupants. Restricted areas are published in the Federal Register and constitute 14 CFR Part 73.”
Warning Areas	“Airspace of defined dimensions, extending from three NM from the U.S. coast, which contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn non-participating pilots of the potential danger. A warning area may be located over domestic or international waters or both.”
MOAs	“Airspace of defined vertical and lateral limits established for separating certain military activities (e.g., air combat maneuvers, air intercepts, testing, etc.) from IFR traffic. Whenever an MOA is in use, non-participating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. Otherwise, ATC will reroute or restrict nonparticipating IFR traffic.”
Alert Areas	“Depicted on aeronautical charts to inform non-participating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. All activity within an alert area must be conducted in accordance with CFRs, without waiver, and pilots of participating aircraft and pilots transiting the area are responsible for collision avoidance.”
Controlled Firing Areas (CFAs)	“Activities that, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of the CFA, as compared to other special use airspace, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. There is no need to chart CFAs since they do not cause a nonparticipating aircraft to change its flight path.”
National Security Areas (NSA)	“Airspace of defined vertical and lateral dimensions established at locations where there is a requirement for increased security and safety of ground facilities. Pilots are requested to voluntarily avoid flying through the depicted NSA. When it is necessary to provide a greater level of security and safety, flight in NSAs may be temporarily prohibited by regulation under the provisions of 14 CFR Section 99.7. Regulatory prohibitions are issued by System Operations, System Operations Airspace and Aeronautical Information Manual (AIM) Office, Airspace and Rules, and disseminated via Notices to Airmen (NOTAM). Inquiries about NSAs should be directed to Airspace and Rules.”

Source: (FAA, 2015c) (FAA, 2008)

Other Airspace Areas

Other airspace areas, explained in Table 11.1.7-7, include Airport Advisory, Military Training Routes (MTR), Temporary Flight Restrictions (TFR), Parachute Jump Aircraft Operations, published Visual Flight Rules (VFR) and IFRs, and Terminal Radar Service Areas.

Table 11.1.7-7: Other Airspace Designations

Type	Definition
Airport Advisory	There are 3 types: • Local Airport Advisory – Operated within 10 statute miles of an airport where there is a Flight Service Station (FSS) located on an airport, but no operational control tower. The FSS advises the arriving and departing aircraft on particular conditions. • Remote Airport Advisory – Operated within 10 statute miles for specific high activity airports with no operational control tower. • Remote Airport Information Service – Used for short-term special events.
MTRs	MTRs are for use by the military for training, specifically low level combat tactics where low altitudes and high speed are needed.
TFRs	TFRs are established to: • Protect people and property from a hazard; • Provide safety for disaster relief aircraft during operations;

Type	Definition
	• Avoid unsafe aircraft congestion associated with an incident or public interest event; • Protect the U.S. President, Vice President, and other public figures; • Provide safety for space operations; and • Protect in Hawaii declared national disasters for humanitarian reasons. Only those TFRs annotated with an ending date and time of "permanent" are included in this Draft PEIS, since it indicates a longer, standing condition of the airspace. Other TFRs are typically a shorter duration of for a one-time specific event.
Parachute Jump Aircraft Operations	Parachute jump area procedures are in 14 CFR Part 105, while the U.S. parachute jump areas are contained in the regional Airport/Facility Directory.
Published VFRs and IRs	These are established routes for moving around and through complex airspace, like Class B airspace. VFRs are procedures used to conduct flights under visual conditions. IFRs are procedures used to conduct flights with instruments and meteorological conditions.
Terminal Radar Service Areas	Airspace areas that are not one of the established U.S. airspace classes. These areas provide additional radar services to pilots.

Source: (FAA, 2015c) (FAA, 2008)

11.1.7.6 Aerial System Considerations

Unmanned Aerial Systems

Unmanned Aerial Systems (UAS) are widely used by the military, private entities, public service, educational institutions, federal/state/local governments, and other agencies. The FAA's Unmanned Aircraft Systems Integration Office integrates UAS into the NAS. The Integration of Civil Unmanned Aircraft Systems in the National Airspace System Roadmap of 2013 addresses the actions and considerations needed to integrate UAS into the NAS "without reducing existing capacity, decreasing safety, negatively impacting current operators, or increasing the risk to airspace users or persons and property on the ground any more than the integration of comparable new and novel technologies" (FAA, 2013).

UAS at airports is a complex operational challenge with the need to separate UAS flight operations from mainstream air traffic. Separation can be achieved with specific UAS launch windows, special airports, or off-airport locations that allow the UAS to easily launch and recover. Special aviation procedures are applied to UAS flights. There must be the capability of Sense and Avoid (SAA) and Control and Communication (C2) during UAS operations. An Unmanned Aircraft (UA) must be able to see (or sense) other aircraft in the area and avoid the aircraft through corrected flight path changes. General equipment and operational requirements can include aircraft anti-collision lights, an altitude encoding transponder, cameras, sensors, and collision avoidance maneuvers. The C2 of the UA occurs with the pilot/operator, the UAS control station, and ATC. Research efforts, a component of the FAA's UAS roadmap, continue to mature the technology for both SAA and C2 capabilities.

Balloons

Moored balloons and unmanned free balloons cannot be operated in a prohibited or restricted area unless approval is obtained from the controlling agency. Balloons also cannot be operated if they pose a hazard to people and their property.

11.1.7.7 Obstructions to Airspace Considerations

The Airports Division of the FAA is responsible for the evaluation and analysis of proposed construction or alterations on airports. The FAA Air Traffic Office is responsible for determining obstructions to air navigation as a result of construction off airports that may affect the safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities. Such facilities include air navigation aids, communication equipment, airports, federal airways, instrument approach or departure procedures, and approved off-airway routes. An Obstruction Evaluation and Airport Airspace Analysis (OE/AAA) is required when there is the potential for airport construction/alteration of a facility that may impinge upon the NAS. Per 14 CFR Part 77.9, the FAA is to be notified about construction or alterations when:

- “Any construction or alteration exceeding 200 ft above ground level
- Any construction or alteration:
  - within 20,000 ft of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 ft
  - within 10,000 ft of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 ft
  - within 5,000 ft of a public use heliport which exceeds a 25:1 surface
- Any highway, railroad, or other traverse way whose prescribed adjusted height would exceed the above noted standards
- When requested by the FAA
- Any construction or alteration located on a public use airport or heliport regardless of height or location” (FAA, 2015e).

Construction or alternative facilities (such as towers) that are subject to FCC licensing requirements are also required to have an OE/AAA performed by the FAA Airport Division.

11.1.7.8 New York Airspace

The New York State Aviation Bureau resides within NYSDOT Office of Integrated Modal Services. The Aviation Bureau's mission is to "provide responsive and responsible leadership in addressing New York's diverse aviation needs" (NYSDOT, 2015h). The Aviation Bureau furthers the implementation of FAA requirements specific to New York. FAA FSDOs for New York reside in Albany, Farmingdale, Garden City, Rochester, and Teterboro (FAA, 2015b).

New York airports are classified as those included in the State Aviation System Plan (SASP) and those that are not part of the SASP. The SASP addresses the strategic planning and future development for the State's airport system, as well as addressing key associated with their airports (National Association of State Aviation Officials (NASAO), 2015). Figure 11.1.7-5 presents the different aviation airports/facilities residing in New York, while Figure 11.1.7-6 and Figure 11.1.7-7 present the breakout by public and private airports/facilities. There are approximately 600 airports within New York as presented in Table 11.1.7-8 and Figure 11.1.7-5 through Figure 11.1.7-7 (USDOT, 2015a).

Table 11.1.7-8: Type and Number of New York Airports/Facilities

Type of Airport or Facility	Public	Private
Airport	130	262
Heliport	5	180
Seaplane	6	11
Ultralight	0	3
Balloonport	0	1
Gliderport	0	2
Total	141	459

Source: (USDOT, 2015a)

There are Class B, C, D, and E controlled airports in New York as follows:

- 1 Class B airport – John F. Kennedy International
- 5 Class C airports –
    - Albany County
    - Greater Buffalo International
    - Long Island MacArthur
    - Greater Rochester International
    - Syracuse Hancock International and Michael Field/Onondaga Flight School
- 13 Class D airports –
    - Binghamton Regional/Edwin A. Link Field, Binghamton
    - Elmira/Corning Regional, Elmira
    - East Hampton
    - Republic, Farmingdale
    - Tompkins County, Ithaca
    - Stewart International, Newburgh
    - Niagara Falls International
    - Dutchess County, Poughkeepsie
    - Griffiss Airfield, Rome
    - Schenectady County, Schenectady
    - Francis S. Gabreski, Westhampton Beach
    - Wheeler Sack Army Airfield, Wheeler Sack
    - Westchester County, White Plains

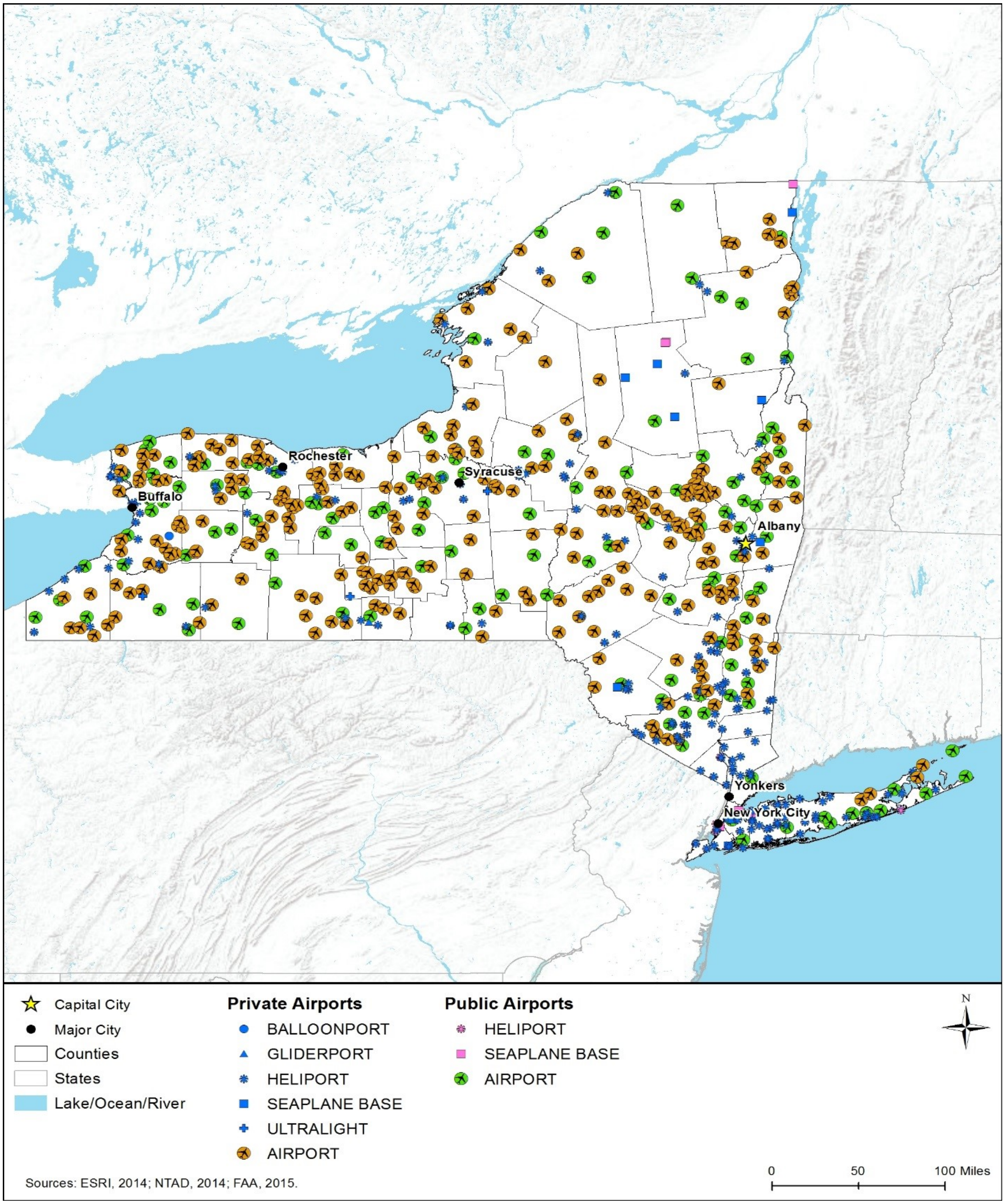

Figure 11.1.7-5: Composite of New York Airports/Facilities

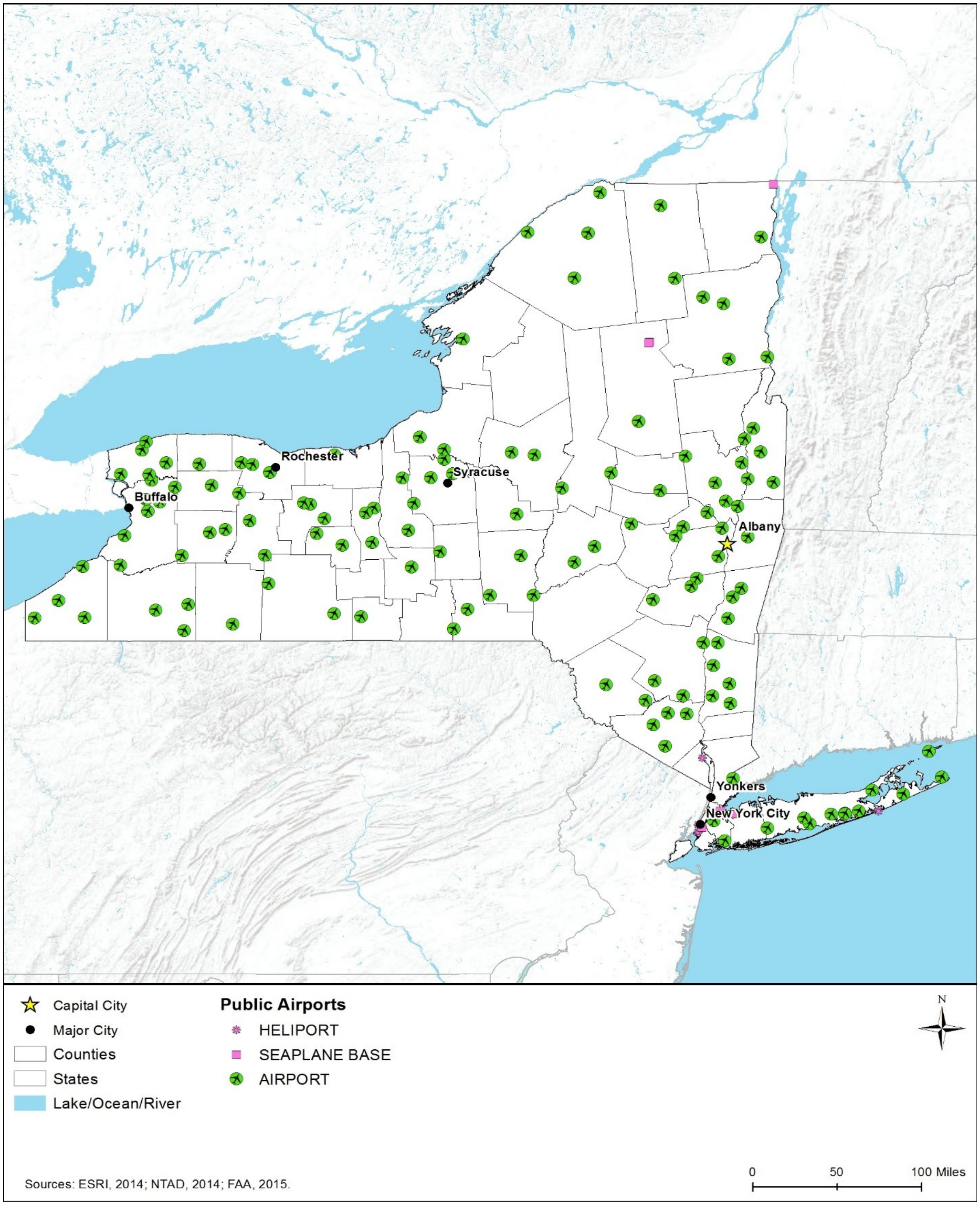

Figure 11.1.7-6: Public New York Airports/Facilities

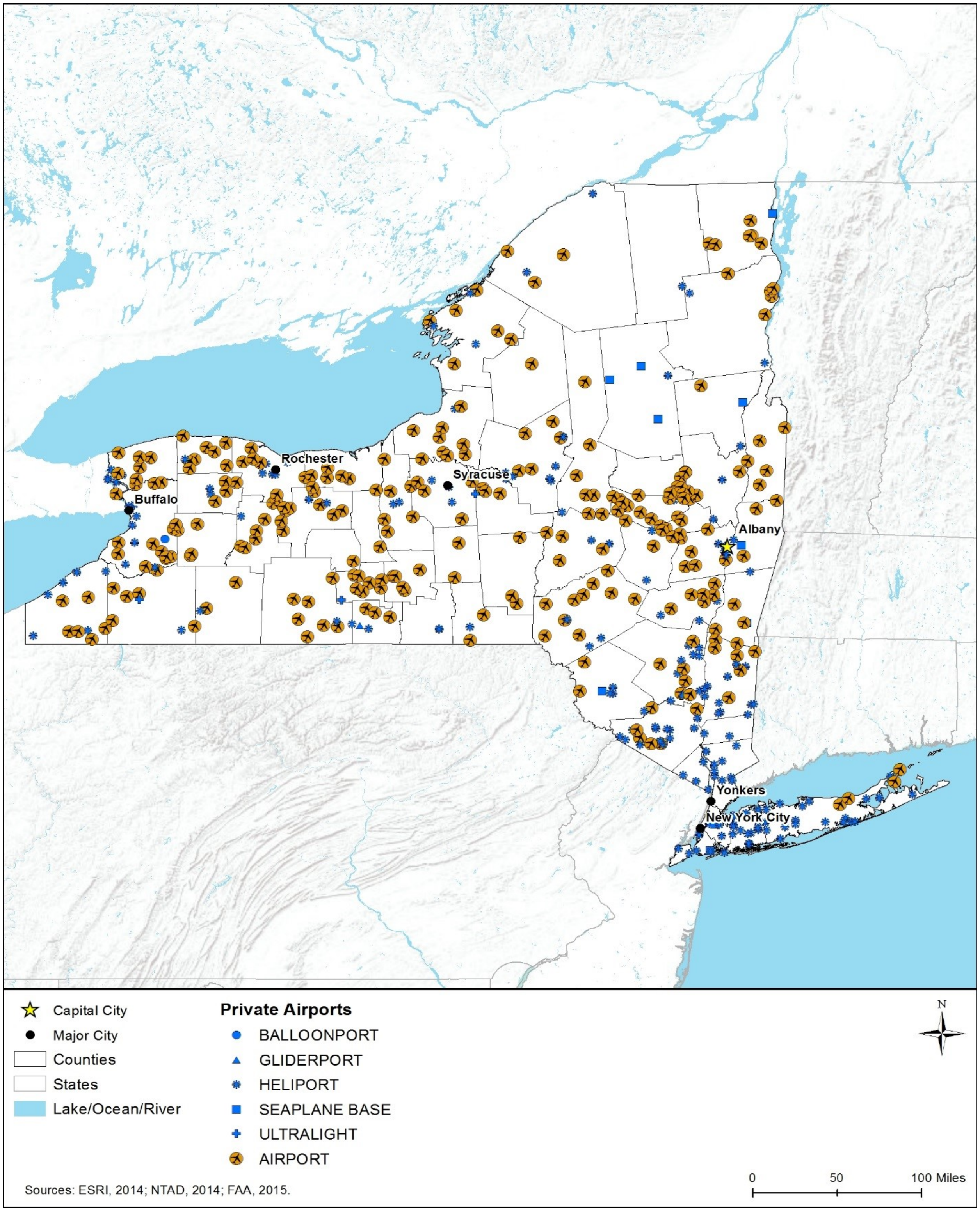

Figure 11.1.7-7: Private New York Airports/Facilities

- 13 Class E airports –
  - Mercer County, Trenton
  - Binghamton Regional/Edwin A. Link Field, Binghamton
  - Elmira/Corning Regional, Elmira
  - Warren County, Glens Falls
  - Tompkins County, Ithaca
  - Chautauqua County/Jamestown, Jamestown
  - Long Island MacArthur
  - Massena International-Richards Field Airport, Massena
  - Niagara Falls International
  - Duchess County, Poughkeepsie
  - Griffiss Airfield, Rome
  - Watertown International
  - Westchester County, White Plains (FAA, 2014b)

SUAs for the state are Restricted (R), Alert (A), and Warning (W), with most SUAs located predominantly in the Fort Drum, Oswego, West Point, and Hancock Field areas. Figure 11.1.7-8 presents the SUAs in New York. Airspace considerations of these areas are as follows:

- Fort Drum (Restricted):
  - R5201 Surface to 23,000 feet MSL
  - R5202A 23,000 feet MSL to flight level (FL) 290
  - R5202B 6,000 feet MSL to FL290
  - R5202C (Altitude designations not annotated in reference sources)
  - Carthage East 100 feet Above Ground Level (AGL) to but not including FL 180
  - Carthage West 6,000 feet MSL to but not including FL 180
  - Drum 500 feet AGL to but not including 5,000 feet MSL
  - Cranberry 500 feet AGL to but not including 6,000 feet MSL
  - Lowville 100 feet AGL to but not including FL 180
  - Tupper Central 6,000 feet MSL to but not including FL 180
  - Tupper East 10,000 feet MSL to but not including FL 180
  - Tupper South 6,000 feet MSL to but not including FL 180
  - Tupper West 6,000 feet MSL to but not including FL 180
- Oswego: R-5203 Surface to FL 500
- West Point: R5206 Surface to and including 5,000 feet MSL
- Air National Guard Hancock Field:
  - Misty 1 - 4,000 feet MSL up to but not including 18,000 feet MSL
  - Misty 2 - 300 feet AGL up to but not including 18,000 feet MSL
  - Misty 3 - 11,000 feet MSL up to but not including 18,000 feet MSL (FAA, 2015f)

Duke MOA used by the Air National Guard, State College, PA extends into the lower western end of New York. The operating altitudes of this MOA are 8,000 feet MSL to but not including FL 180 (FAA, 2015f). The SUAs designated as CYA518 and CYA520(M) in Figure 11.1.7-8 are advisory areas within the Canadian designated Class F airspace for the Ontario region, specifically known as (1) Advisory Area 518 in Ontario, Canada; and Military Operations in Advisory Area 530 in Ontario, Canada[153] (Government of Canada, 2015). There are two TFRs over New York City and the surrounding area (5/7385 and 5/7386) (FAA, 2015g). Figure 11.1.7-9 presents the MTRs for New York consisting of two Slow Routes (823 and 825), four Visual Routes (707, 724, 725, and 1801), and one Instrument Route (801).

UAS Considerations

The FAA UAS test site at the Griffiss International Airport, Rome, NY, is now operational and the fifth of six U.S. UAS test sites. Research from this test site focuses on methods for collecting data and monitoring crops for the detection of insects, weeds, diseases, and other pests. Information gained from this research also supports the integration of UAS into the NAS. The UAS is the PrecisionHawk Lancaster Platform with a wing span of approximately four feet and a weight of approximately three pounds (FAA, 2015h) (PrecisionHawk, 2015).

The NPS signed a policy memorandum on June 24, 2014 that “directs superintendents nationwide to prohibit launching, landing, or operating unmanned aircraft on lands or waters administered by the National Park Service” (NPS, 2014a). There are 22 national parks within New York that have to comply with this agency directive (NPS, 2015i).

[153] Canadian Class F Airspace Designation - Defined dimensions where certain activities are confined and aircraft not part of the designated activities may have operating limits within the area. Restricted and advisory areas of Class F airspace are assigned with a four-part designation code: Part (a) = the nationality letters of Canada – CY; Part (b) = Restricted Area – R (letter D is for danger area when associated with established R areas over international waters), and Advisory Area – A; Part (c) = three-digit number identifying the Canadian region for which the area lies – for this Chapter 500-599 represents the Ontario region; and Part (d) = type of activity occurring in that area as designated by a letter in parentheses after the three-digit number – for this Chapter M is for military operations (Note: Data source did provide an activity designation for CYA518).

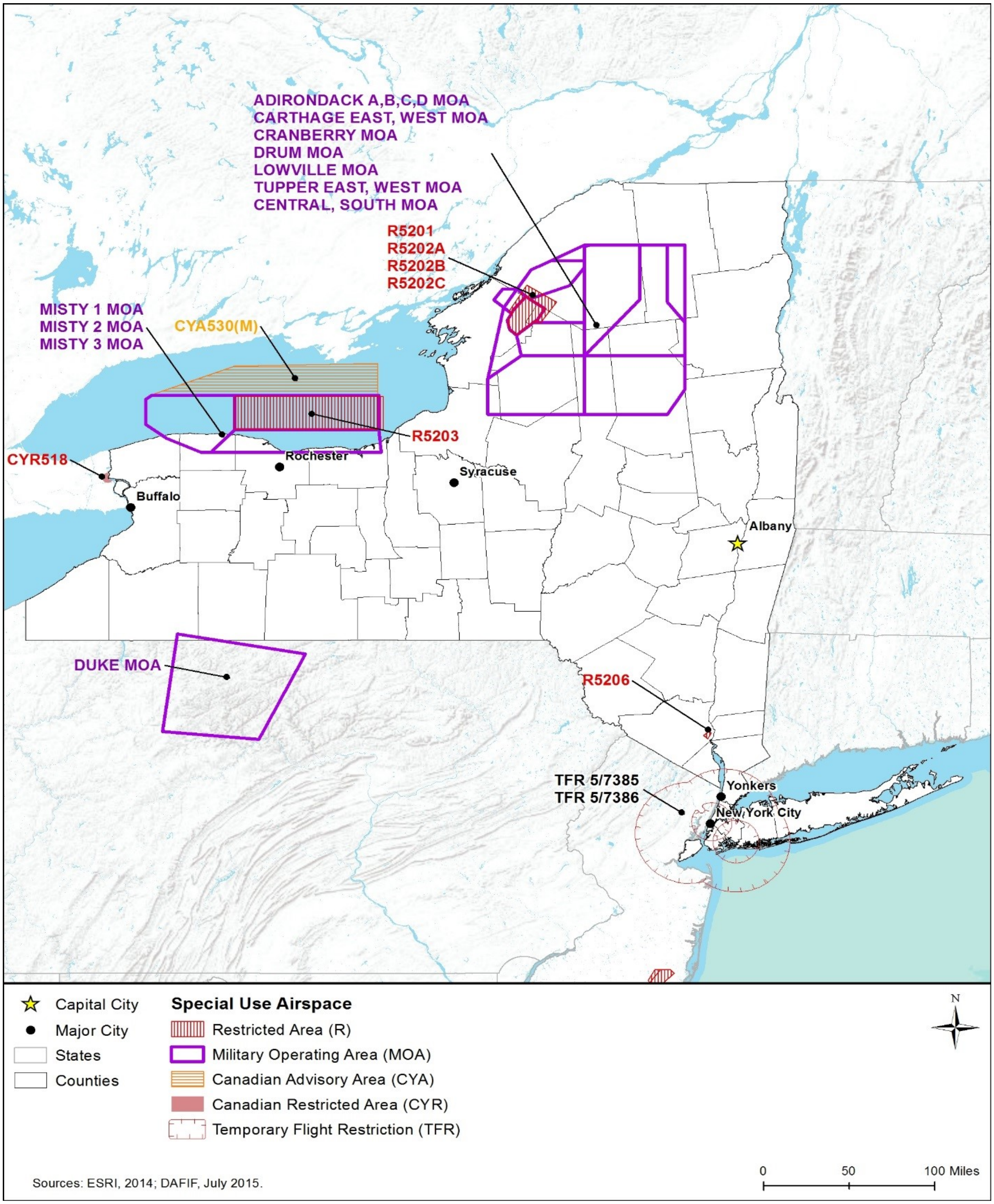

Figure 11.1.7-8: SUAs in New York

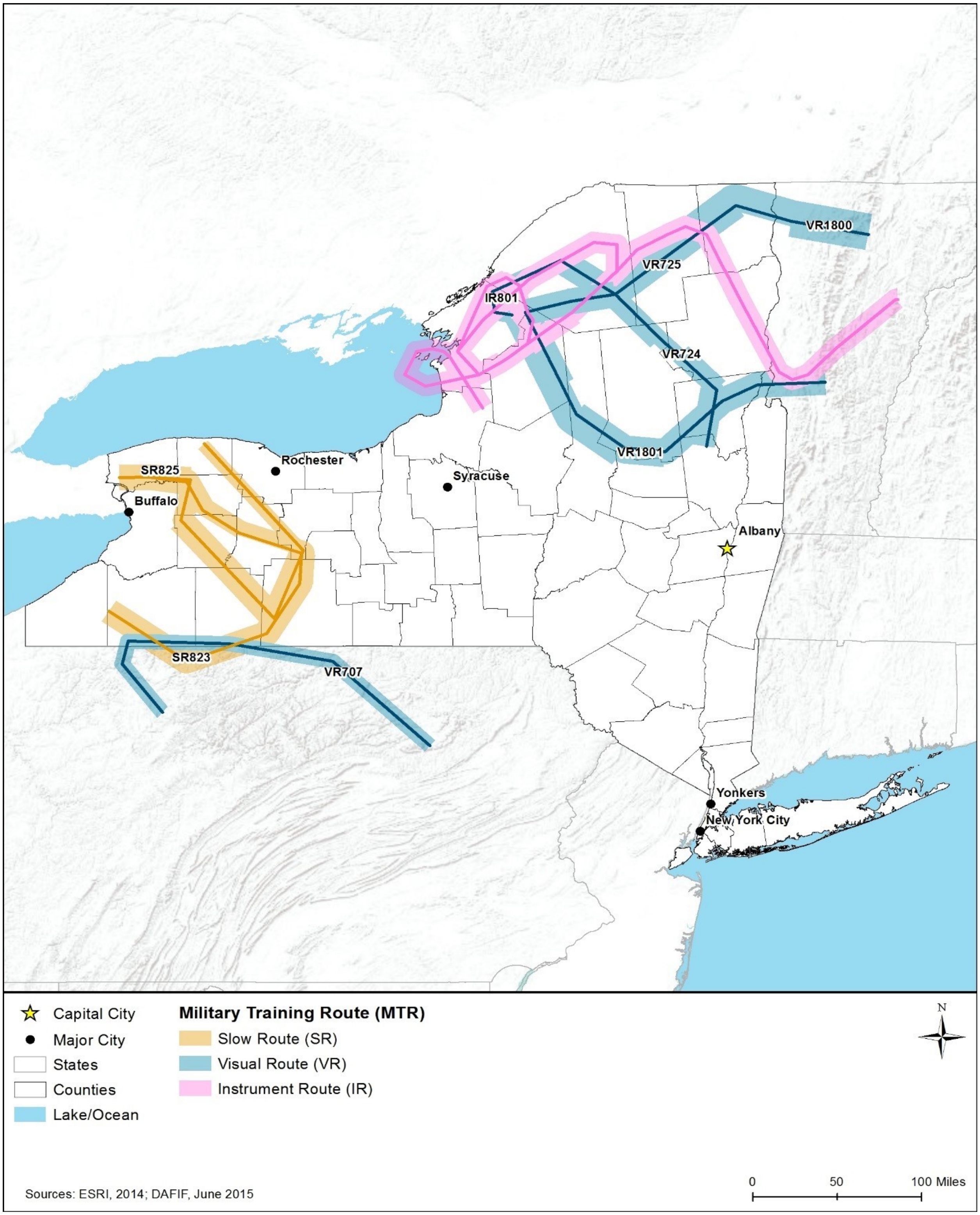

Figure 11.1.7-9: MTRs in New York

11.1.8 Visual Resources

11.1.8.1 Definition of the Resource

Visual resources influence the human experience of a landscape. Various aspects combine to create visual resources, such as color, contrast, texture, line, and form. Features such as mountain ranges, city skylines, ocean views, unique geological formations, rivers, and constructed landmarks such as bridges, memorials, cultural resources, or statues are considered visual resources. For some, cityscapes are valued visual resources; for others, views of natural areas are valued visual resources. While many aspects of visual resources are subjective, evaluating potential impacts on the character and continuity of the landscape is a consideration when evaluating proposed actions for NEPA and National Historic Preservation Act (NHPA) compliance. A general definition of visual resources used by the Bureau of Land Management is "the visible physical features on a landscape (e.g., land, water, vegetation, animals, structures, and other features)" (BLM, 1984).

11.1.8.2 Specific Regulatory Consideration

Table 11.1.8-1 presents state and local laws and regulations that relate to visual resources.

Table 11.1.8-1: Relevant New York Visual Resources Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
New York Consolidated Laws, Parks, Recreation and Historic Preservation Law, Title G, § 35.15	State Historic Preservation Office (SHPO)	Requires the preservation of heritage area resources through the establishment of standards and criteria and to enact preservation measures "sufficient to insure that these standards shall be achieved."
State Natural Areas: Article XIV of the New York State Constitution	NYSDEC	Ensures the protection of the state forest preserves and natural areas. The areas "shall be forever kept as wild forest lands."
NYSDEC Program Policy DEP-00-2, "Assessing and Mitigating Visual Impacts"	NYSDEC	Established the state's policy under the authority of Articles 8 and 49 of the State Constitution: "When a facility is potentially within the viewshed of a designated aesthetic resource, the Department will require a visual assessment, and in the case where significant impacts are identified, require the applicant to employ reasonable and necessary measures to either eliminate, mitigate, or compensate for adverse aesthetic effects."

In addition to the state laws and regulations, local zoning laws may apply related to visual resources. Viewsheds and scenic vistas are increasingly important to the state's towns, cities, and villages as they look at the future planning of their municipalities. According to the New York State Legislative Commission on Rural Resources, 30 of 57 counties in New York have plans for comprehensive planning and development, many of which include consideration of visual resources, scenic easements, and telecommunications regulations. Where counties, cities, towns, or villages have planning documents that address scenery, character, or visual resources, the placement of towers or temporary transmission structures would be required to comply with the management or provide mitigation measures to meet compliance (New York State Legislative Commission on Rural Resources 2008).

11.1.8.3 Character and Visual Quality of the Existing Landscape

New York has a wide range of visual resources. In New York City, the well-known Manhattan skyline, the Statue of Liberty, and the Empire State building are urban vistas that are recognized all over the world. Although the urban areas of New York frequently come to mind, the vast majority of the state is characterized as forested, agricultural, or undeveloped (Figure 11.1.7-1 in Section 11.1.7, Land Use, Recreation, and Airspace). There are three major mountain ranges in the state: the Adirondack Mountains, the Catskill Mountains, and the Appalachian Mountains. The northern and western portion of the state borders two Great Lakes: Lake Ontario, and Lake Erie.

According to the NYSDEC, forested areas are the most prevalent visual resource within the state. Visual resources within forested areas are generally comprised of continuous, natural looking cover with gradual transitions of line and color. They are typically characterized by the lack of disturbance or disruption of the landscape. Agricultural lands are the second most dominant landscape in the state. These areas generally have some abrupt lines and colors between crops and pastures, few tall structures (aside from grain silos and some trees), and no urban development. Lakes, rivers, wetlands, and waterfront lands in New York vary from vegetated riparian areas (areas located on the bank of a watercourse, lake, or tidewater) to oceanside villages, and wide, open lakeside vistas. The consistency, continuity, and lack of view obstructions from major constructed features characterizes the visual attributes of these areas (New York State Legislative Commission on Rural Resources 2008).

One aspect of importance for visual resources is to maintain the character of the area. For example, in a farm community, keeping the character of the town consistent with farm-style houses, barns, and silos would be key in maintaining the character of the community. In a more metropolitan area, there may be many different visual styles within each neighborhood, but keeping the character of the neighborhood is important to maintain if new development were to occur. Section 11.1.7 discusses land use and contains further descriptions of land cover within the state.

While the state and many municipalities have some regulation of scenic and visual resources, not all scenic areas within the state have been identified or have policy or regulations for management or protection by the state. The areas listed below have some measure of management, significance, or protection through state or federal policy, as well as being identified as a visually significant area.

11.1.8.4 Visually Important Historic Properties and Cultural Resources

Visual and aesthetic qualities of historic properties can contribute to the overall importance of a particular site. Such qualities relate to the integrity of the appearance and setting of these properties or resources. Viewsheds (the natural and manmade environment visible from one or more viewing points) can also contribute to the significance of historic properties or cultural resources. Viewsheds containing historic properties and cultural resources may be considered important because of their presence in the landscape. Figure 11.1.8-1 shows areas that are included in the National Register of Historic Places (NRHP) that may be considered visually sensitive. In New York, there are 5,703 NRHP listed sites, which include four National Heritage Areas, 271 National Historic Landmarks, 10 National Historical Sites, two National Historical Parks, and six National Monuments. Section 11.1.11 provides details on the historic resources in New York. Some State Historic Sites, State Heritage Areas, and State Historic Districts may also be included in the NRHP, whereas others are not designated at this time.

The NPS is required to protect all aspects of historic landscapes considered significant, such as forests, gardens, trails, structures, ponds, and farming areas using The Secretary of the Interior's Standards for the Treatment of Historic Properties and the Guidelines for the Treatment of Cultural Landscapes. The standards and guidelines "require retention of the greatest amount of historic fabric, including the landscape's historic form, features, and details as they have evolved over time," which directly protects the historic properties and the visual resources therein (Weeks, 1995).

National Heritage Areas

National Heritage Areas (NHAs) are "places where natural, cultural, and historic resources combine to form a cohesive, nationally important landscape" (NPS 2011). These areas help tell the history of the United States. Based on this criteria, NHAs in New York may contain scenic or aesthetic areas considered visual resources or visually sensitive. There are four NHAs in New York: Champlain Valley National Heritage Partnership, Hudson River Valley National Heritage Area, Erie Canalway National Heritage Corridor, and Niagara Falls National Heritage Area (Figure 11.1.8-1).

National Historic Landmarks

National Historic Landmarks (NHL) are defined as "nationally significant historic places designated by the U.S. Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States" (NPS, 2015j). Generally, NHLs are comprised of historic buildings such as residences, churches, civic buildings, and institutional buildings. Other types of historic properties include battlefields and canals. The importance of NHL-designated properties can be attributed to scenic or aesthetic qualities that may be considered visual resources or visually sensitive at these sites. In New York, there are 271 NHLs, including sites such as the Susan B. Anthony House, Carnegie Hall, St. Paul's Cathedral, and the Erie Canal (Figure 11.1.8-1) (NPS, 2015k). By comparison, there are over 2,500 NHLs in the United States, with over 10 percent of these located in New York. The majority of New York's NHLs are located in New York City.

Figure 11.1.8-1: Cultural and Heritage Resources that May be Visually Sensitive

State Heritage Areas

The New York Heritage Area System was established to preserve areas with special historical importance to New York. New York State Heritage Areas are "places where unique qualities of geography, history, and culture create a distinctive identity that becomes the focus of four heritage goals: preservation of significant resources; education that interprets lessons from the past; recreation and leisure activities; and economic revitalization for sustainable communities" (New York Office of Parks, Recreation, and Historic Preservation, 2015s). State Heritage Areas are likely to contain scenic or aesthetic components that may be considered visual resources or visually sensitive. There are 20 designated heritage areas throughout the state from rural areas to urban areas (Table 11.1.8-2) (New York Office of Parks, Recreation, and Historic Preservation, 2015b). Examples of heritage areas include the Lake Erie Concord Grape Belt, the New York City Harbor Park, and the town of Seneca Falls. For additional information regarding these properties and resources, see Section 11.1.11, Cultural Resources. In addition, the New York State Historic Preservation Office (SHPO) maintains an online property database at https://cris.parks.ny.gov/ffLogin.aspx?ReturnUrl=%2f.

Table 11.1.8-2: State Heritage Areas

State Heritage Area Name	
Albany	Buffalo Michigan Street
Buffalo Theater District	Hudson-Mohawk - RiverSpark
Kingston	Lake Erie Concord Grape Belt
Long Island North Shore	Mohawk Valley
New York City – Harbor Park	Niagara Falls Underground Railroad
Ossining	Rochester – High Falls
Sackets Harbor	Saratoga Springs
Schenectady	Seneca Falls
Susquehanna	Syracuse
Western Erie Canal	Whitehall

Source: (New York Office of Parks, Recreation, and Historic Preservation, 2015b)

11.1.8.5 Parks and Recreation Areas

Parks and recreation areas include state parks, National Recreation Areas, National Seashores, National Forests, and National and State Trails. Parks and recreation areas often contain scenic resources and tend to be visited partly because of their associated visual or aesthetic qualities. Figure 11.1.7-1 in Section 11.1.7, Land Use, Recreation, and Airspace, identifies parks and recreational resources that may be visually sensitive in New York. For additional information about recreation areas, including national and state parks, see Section 11.1.7, Land Use, Recreation, and Airspace. Figure 11.1.8-2 displays natural areas that may be visually sensitive, including park and recreation areas.

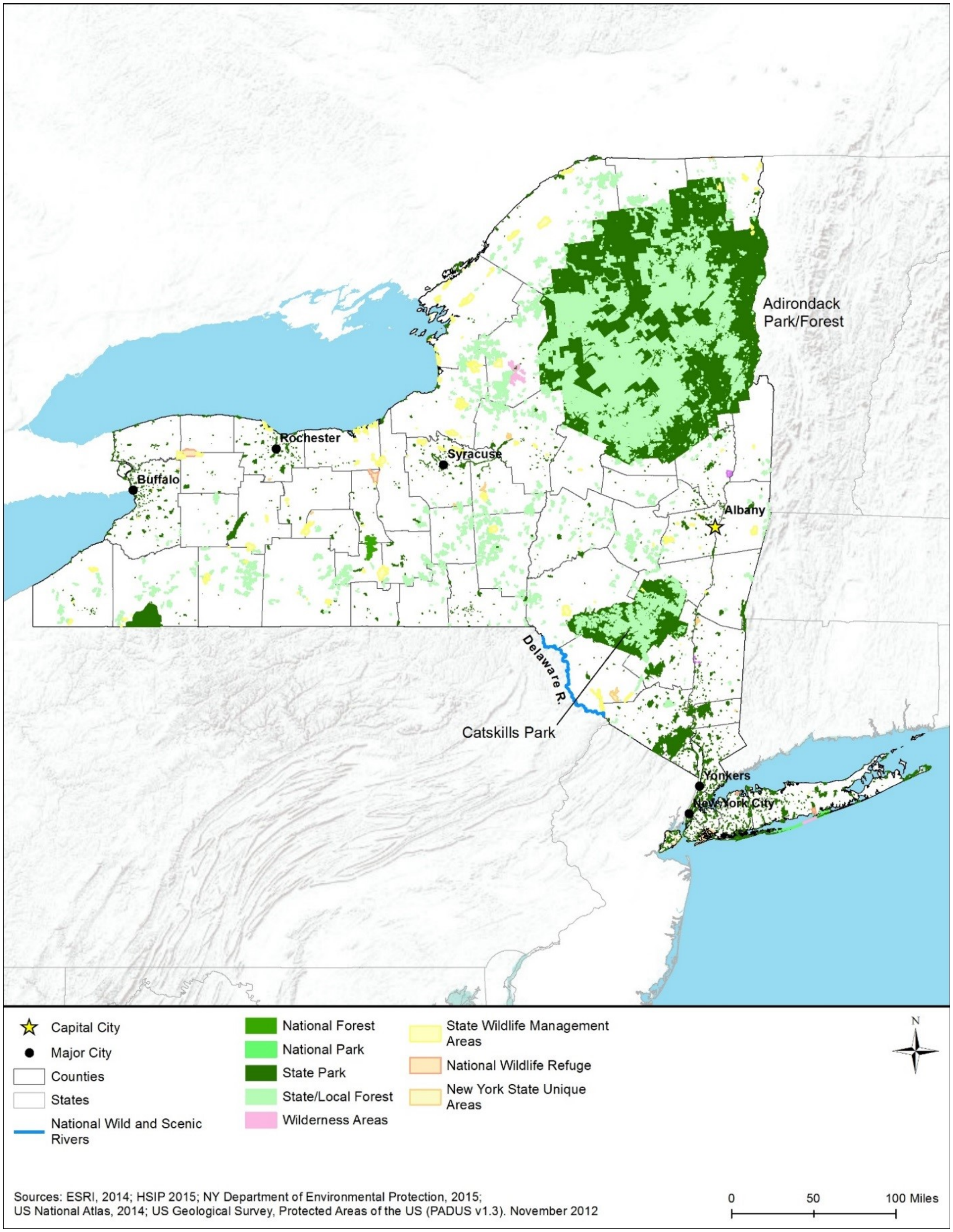

Figure 11.1.8-2: Natural Areas that May be Visually Sensitive

U.S. National Park System

National Parks are managed by the NPS and contain natural, historic, cultural, visual, ecological, and recreational resources of significance to the nation and are maintained for the public's use. In New York, there are there are 22[154] officially designated National Parks in addition to other NPS affiliated areas, such as National Heritage Areas. There are five National Monuments, 10 National Historic Sites, three National Memorials, four National Heritage Areas, two National Historical Parks, one National Recreation Area, and one National Seashore (Figure 11.1.8-3). Table 11.1.8-3 identifies the National Park System units located in New York. For additional information regarding parks and recreation areas, see Section 11.1.7, Land Use, Recreation, and Airspace.

Figure 11.1.8-3: Fire Island National Seashore

Source: (NPS, 2015l)

Table 11.1.8-3: National Park Service Areas and Affiliated Areas

NPS Area Name[1]	
African Burial Ground National Monument	Castle Clinton National Monument
Eleanor Roosevelt National Historic Site	Ellis Island (part of Statue of Liberty National Monument)
Federal Hall National Memorial	Fire Island National Seashore
Fort Stanwix National Monument	Gateway National Recreation Area
General Grant National Memorial	Governors Island National Monument
Hamilton Grange National Memorial	Home of Franklin D. Roosevelt National Historic Site
Hudson River Valley National Heritage Area	Lower East Side Tenement Museum National Historic Site

[154] This count is based on the NPS website "by the numbers" current as of 9/30/2014 (U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, 2016). Actual lists of parks and NPS affiliated areas may vary here depending on when areas are designated by Congress.

NPS Area Name[1]	
Marin Van Buren National Historic Site	Niagara Falls National Heritage Area
Sagamore Hill National Historic Site	Saint Paul's Church National Historic Site
Saratoga National Historical Park	Statue of Liberty National Monument
Theodore Roosevelt Birthplace National Historic Site	Theodore Roosevelt Inaugural National Historic Site
Thomas Cole National Historic Site	Vanderbilt Mansion National Historic Site
Women's Rights National Historical Park	

Source: (NPS, 2015m)

[1] Properties may be managed by the NPS or affiliated with the NPS and managed by another Agency

National Forests

Finger Lakes National Forest is the sole National Forest in New York. The USFS conducts inventories of the forest lands and assigns scenic resource categories from which they manage for scenic and visual resources (USFS, 1995). The scenic inventories are used to manage the forest landscape and to protect areas of high scenic integrity (USFS, 1995).

State Parks

State parks contain natural, historic, cultural, and/or recreational resources of significance to New York residents and visitors. There are 179 state parks throughout New York (Figure 11.1.8-2), most of which contain scenic or aesthetic areas considered to be visual resources or visually sensitive (New York Office of Parks, Recreation, and Historic Preservation, 2015t). Table 11.1.8-4 contains a sampling of state parks and their associated visual attributes. For a complete list of state parks, visit the New York Office of Parks, Recreation, and Historic Preservation website (New York Office of Parks, Recreation, and Historic Preservation, 2015t).

Table 11.1.8-4: Examples of New York State Parks and Associated Visual Attributes

State Park	Visual Attributes
Allegany	Lake, beach, and forest vitas Thunder Rocks bedrock city and the Stone Tower Structure
Bayswater Point	Views of Mott Basin and Jamaica Bay, beachfront, wetlands, and woodland views
Chimney Bluffs	Lake Ontario views, massive earthen spires (Figure 11.1.8-4)
Minnewaska	Crystalline sky lakes, hardwood forests, incising sheer cliffs, waterfalls

Source: (New York Office of Parks, Recreation, and Historic Preservation, 2015t)

Adirondack Park, created in 1892 by the state, is the largest publicly protected state park and largest NHL in the contiguous United States. The park is managed by the state with mixed ownership of the park comprised of the federal government, state government, and large areas of inholdings owned by private landowners. The boundary of the park encompasses approximately 6 million acres in northern New York, including portions of Saint Lawrence, Franklin, Clinton, Lewis, Herkimer, Hamilton, Essex, Oneida, Fulton, Warren, Saratoga, and Washington Counties. Adirondack Park includes over 2,000 miles of hiking trails, more than 3,000 lakes, and 30,000 miles of streams and rivers with an estimated 7 to 10 million annual visitors and 200,000 seasonal residents (APA, 2015b).

Figure 11.1.8-4: Chimney Bluffs State Park

Source: (New York Office of Parks, Recreation, and Historic Preservation, 2015u)

There are a number of state, county, and town parks in Orange and Rockland Counties, located along the Palisades Park, many of which are operated in conjunction with the Palisades Interstate Park Commission. These parks contain scenic vistas and unique visual characteristics (New York Office of Parks, Recreation, and Historic Preservation, 2015k). Chimney Bluffs state park (Figure 11.1.8-4) displays unique landforms on the shores of Lake Ontario.

State and Federal Trails

State-designated trails include heritage trails, greenway trails, and water trails. Heritage trails are "existing non-linear resources associated with historical movements or themes" (New York Office of Parks, Recreation, and Historic Preservation, 2015v). Greenway trails and multi-use trails connect public places for recreation, conservation, and transportation purposes. Water trails are recreational water routes for canoes, kayaks, and small-motorized watercraft. These trails contain visual resources such as historic views, forest and woodland views, and scenic vistas of valleys and gorges. There are over 16,000 miles of state designated trails in New York (New York Office of Parks, Recreation, and Historic Preservation, 2010).

Designated under Section 5 of the National Trails System Act (16 U.S.C. 1241-1251, as amended), National Scenic Trails (NST) are defined as extended trails that "provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas though which they pass" (NPS, 2012a). There are two National Scenic Trails within New York: the North Country NST and the Appalachian NST, both administered by the NPS. The North Country NST is a 3,200-mile-long trail extending from eastern New York to North Dakota. The Appalachian NST is a 2,185-mile trail through the Appalachian Mountains. The Washington-Rochambeau Revolutionary Route, a National Historic Trail, also passes through the state (NPS, 2014b).

11.1.8.6 Natural Areas

National Wilderness Areas

In 1964, Congress enacted the Wilderness Act of 1964 as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. A designation as a National Wilderness Area is the highest level of conservation protection given by Congress to federal lands. This Act defined wilderness as land untouched by man and primarily affected only by the “forces of nature” and as that which “may also contain ecological, geological, or other features of scientific, education, scenic, or historical value.” Over 106 million acres of federal public lands have been designated as wilderness areas. Twenty-five percent of these federal lands are in 47 national parks (44 million acres) and part of National Park System. These designated wilderness areas are managed by the USFS, Bureau of Land Management, U.S. Fish and Wildlife Service, and National Park Service (NPS, 2015n). New York is home to one federally managed Wilderness Areas on Long Island, the Otis Pike Fire Island High Dune Wilderness (Figure 11.1.8-2) (NPS, 2015n).

State Forest Preserves

New York forest preserve lands are located in the Adirondack Forest Preserve (approximately 2.6 million acres located within the Adirondack Park) and the Catskill Forest Preserve (approximately 290,000 acres located within the Catskill Park) (Figure 11.1.8-2). These lands are state-owned property protected under Article XIV of the New York State Constitution, and are recognized as having exceptional scenic, recreational, and ecological value (NYSDEC, 2000).

Rivers Designated as National or State Wild, Scenic or Recreational

National Wild, Scenic, or Recreational Rivers are those rivers designated by Congress or the Secretary of the Interior in accordance with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287). These rivers have outstanding natural, cultural, and recreational values, including potential visual resources. A portion of only one river, the Delaware River, has been designated a National Wild and Scenic River in New York (Figure 11.1.8-5 or Figure 11.1.4-1, Major New York Watersheds) (National Wild and Scenic Rivers System 2015b). A portion of one other waterbody in New York, the East Branch of Fish Creek in Lewis County, was studied for its potential for inclusion in the National Wild and Scenic Rivers System, but has not yet been included in the system (National Wild and Scenic Rivers System, 2015c).

Figure 11.1.8-5: Upper Delaware River Wild and Scenic River

Source: (National Wild and Scenic Rivers System 2015b)

National Wildlife Refuges and State Wildlife Management Areas

The USFWS manages NWRs throughout the state; these lands and waters are "set aside for the conservation, management and, where appropriate, restoration of fish, wildlife, and plant resources and their habitats" (USFWS, 2015m). There are 10 NWRs in New York, with seven located within the Long Island NWR Complex (Table 11.1.8-5). This complex covers approximately 6,500 acres of wildlife oases among Long Island's urban areas (USFWS, 2013b). Visual resources within the NWRs include views and sites of the coast, beaches, wildlife, and naturally vegetated areas.

Table 11.1.8-5: New York National Wildlife Refuges

NWR Name	
Iroquois	Montezuma
Shawangunk Grassland	Elizabeth A. Morton
Amagansett	Target Rock
Conscience Point	Oyster Bay
Wertheim	Seatuck

Source: (USFWS, 2015m)

State Wildlife Management Areas (WMAs) are lands owned by New York that "have been acquired primarily for the production and use of wildlife," including research on wildlife species and habitat management (NYSDEC, 2015by). WMAs are under the control and management of the Department's Division of Fish, Wildlife, and Marine Resources. There are 85 WMAs covering over 200,000 acres scattered throughout the state (NYSDEC, 2015by).

National Natural Landmarks

National Natural Landmarks (NNL) are sites designated by the U.S. Secretary of the Interior that "contain outstanding biological and/or geological resources, regardless of land ownership, and are selected for their outstanding condition, illustrative value, rarity, diversity, and value to science and education" (NPS, 2014c). These landmarks may be considered visual resources or visually sensitive. In New York, 28 NNLs exist entirely or partially within the state (Table 11.1.8-6). Some of the natural features located within these areas include the largest known exposed fault system in the U.S. at Mianus River Gorge; Round Lake, one of 11 known meromictic lakes (lakes with layers of water that do not intermix) in the U.S.; and Moss Island, the best exposure of glacial meltwater potholes in the eastern U.S. (NPS, 2012b). Another example, Fall Brook Gorge NNL, contains scenic waterfalls, forested areas, and meandering streams (Figure 11.1.8-6).

Figure 11.1.8-6: Fall Brook Gorge

Source: (NPS, 2012c)

Table 11.1.8-6: New York National Natural Landmarks

NNL Name	
Albany Pine Bush	Bear Swamp
Bergen-Byron Swamp	Big Reed Pond
Chazy Fossil Reef	Deer Lick Nature Sanctuary
Dexter Marsh	Ellenville Fault-Ice Caves
Fall Brook Gorge	Fossil Coral Reef
Hart’s Woods	Hook Mountain and Nyack Beach State Park
Iona Island Marsh	Ironsides Island
Lakeview Marsh and Barrier Beach	Long Beach Orient State Park
McLean Bogs	Mendon Ponds Park
Mianus River Gorge	Montezuma Marshes
Moss Island	Moss Lake Bog
Oak Orchard Creek Marsh	Palisades of the Hudson
Petrified Gardens	Round Lake
Thompson Pond	Zurich Bog

Source: (NPS, 2012d)

11.1.8.7 Additional Areas

State and National Scenic Byways

National Scenic Byways are resources designated specifically for scenic or aesthetic areas or qualities which would be considered visual resources or visually sensitive. New York has three designated National Scenic Byways: the Great Lakes Seaway Trail, the Lakes to Locks Passage, and the Mohawk Towpath Byway (Figure 11.1.7-3) (NYSDOT, 2015l). The National Scenic Byways Program is managed by the U.S. Department of Transportation, Federal Highway Administration.

Similar to National Scenic Byways, New York Scenic Byways are transportation corridors that are of particular statewide interest. There are 26 State Scenic Byways, including the Great Lakes Seaway Trail, which is both a designated National Scenic Byway and a State Scenic Byway. In addition to New York Scenic Byways, there are 46 State Scenic Roads and 19 State Parkways (NYSDOT, 2015m).

Scenic Areas of Statewide Significance

Scenic Areas of Statewide Significance (SASS) are designated by the New York Department of State based on a scenic assessment program developed by the Division of Coastal Resources. This program identifies the scenic qualities of coastal landscapes, evaluates them against criteria for determining aesthetic significance, and recommends areas for designation. An SASS designation protects scenic landscapes through the review of projects requiring state or federal actions, including direct actions, permits, or funding (Office of Planning and Development, 2015). Six areas within the Hudson River Valley coastal regions in Columbia, Greene, Dutchess, and Ulster Counties were designated as SASS in 1993. In 2010, 25,000 acres were designated as SASS, creating nine new areas on Long Island’s East End, all within the Town and Village of East Hampton (Office of Planning and Development, 2015).

Bond Act Properties

Bond Act Properties are properties purchased under the “Exceptional Scenic Beauty” or “Open Space” categories of the Environmental Quality Bond Act of 1986 (NYSDEC, 2015bz). Properties included in the “Exceptional Scenic Beauty” category are defined as “land forms, waterbodies, geologic formations, and vegetation that possess significant scenic qualities or significantly contribute to scenic value” (NYSDEC, 2015bz). Properties included in the “Open Space” category are defined as open or natural land in or near urban or suburban areas necessary to serve the scenic or recreational needs thereof (NYSDEC, 2015bz). Since 1986, a number of properties have been acquired under the act; details on these properties from NYSDEC were unavailable as of July 2015.

11.1.9 Socioeconomics

11.1.9.1 Definition of the Resource

NEPA requires consideration of socioeconomics; specifically, Section 102(A) of NEPA requires federal agencies to "insure the integrated use of the natural and social sciences…in planning and in decision making" (42 U.S.C. 4332(A)). Socioeconomics refers to a broad, social science-based approach to understanding a region's social and economic conditions. It typically includes population, demographic descriptors, economic activity indicators, housing characteristics, property values, and public revenues and expenditures. When applicable, it includes qualitative factors such as community cohesion. Socioeconomics provides important context for analysis of FirstNet projects as those projects may affect the socioeconomic conditions of a region.

The choice of socioeconomic topics and depth of their treatment depends on the relevance of potential topics to the types of federal actions under consideration. FirstNet's mission is to provide public safety broadband and interoperable emergency communications coverage throughout the nation. Relevant socioeconomic topics include population density and growth, economic activity, housing, property values, and state and local taxes.

Environmental justice is a related topic that specifically addresses the presence of minority populations (defined by race and Hispanic ethnicity) and low-income populations, in order to give special attention to potential impacts on those populations, per Executive Order (EO) 12898 (see Section 1.8). This PEIS addresses environmental justice in a separate section (Section 11.1.10). This PEIS also addresses the following topics, sometimes included within socioeconomics, in separate sections: land use and recreation (Section 11.1.7, Land Use, Recreation, and Airspace); infrastructure and public services (Section 11.1.1, Infrastructure); and aesthetic considerations (Section 11.1.8, Visual Resources).

The financial arrangements for deployment and operation of the FirstNet network may have socioeconomic implications. Section 1.1 frames some of the public expenditure and public revenue considerations specific to FirstNet; however this is not intended to be either descriptive or prescriptive of FirstNet's financial model or anticipated total expenditures and revenues associated with the deployment of the Nationwide Public Safety Broadband Network (NPSBN). This socioeconomics section provides some additional, broad context, including data and discussion of state and local government revenue sources that FirstNet may affect.

Wherever possible, this section draws on nationwide datasets from federal sources such as the U.S. Census Bureau (Census Bureau) and U.S. Bureau of Labor Statistics (BLS). This ensures consistency of data and analyses across the states examined in this PEIS. In all cases, this section uses the most recent data available for each geography at the time of writing. At the county, state, region, and United States levels, the data are typically for 2013 or 2014. For smaller geographic areas, this section uses data from the Census Bureau's American Community Survey (ACS). The ACS is the Census Bureau's flagship demographic estimates program for years other than the decennial census years. This PEIS uses the 2009-2013 ACS, which is based on surveys (population samples) taken across that five-year period; thus, it is not appropriate to attribute its data values to a specific year. It is a valuable source because it provides the most accurate and consistent socioeconomic data across the nation at the sub-county level.

The remainder of this section addresses the following subjects: regulatory considerations specific to socioeconomics in the state, communities and populations, economic activity, housing, property values, and taxes.

11.1.9.2 Specific Regulatory Consideration

Research for this section did not identify any specific state, local, or tribal laws or regulations that are directly relevant to socioeconomics for this PEIS.

11.1.9.3 Communities and Populations

This section discusses the population and major communities of New York. It includes the following topics:

- Recent and projected statewide population growth
- Current distribution of the population across the state
- Identification of the largest population concentrations in the state

Statewide Population and Population Growth

Table 11.1.9-1 presents the 2014 population and population density of New York in comparison to the East region[155] and the nation. The estimated population of New York in 2014 was 19,746,227. The population density was 419 persons per square mile (sq. mi.), which is higher than the population density of both the region (312 persons/sq. mi.) and the nation (90 persons/sq. mi.). In 2014, New York was the fourth largest state by population among the 50 states and the District of Columbia, 30th largest by land area, and had the eighth greatest population density (U.S. Census Bureau, 2015a) (U.S. Census Bureau, 2015d).

Table 11.1.9-1: Land Area, Population, and Population Density of New York

Geography	Land Area (sq. mi.)	Estimated Population 2014	Population Density 2014 (persons/sq. mi.)
New York	47,126	19,746,227	419
East Region	237,157	73,899,862	312
United States	3,531,905	318,857,056	90

Sources: (U.S. Census Bureau, 2015a) (U.S. Census Bureau, 2015d)

Population growth is an important subject for this PEIS given FirstNet's mission. Table 11.1.9-2 presents the population growth trends of New York from 2000 to 2014 in comparison to the East region and the nation. The state's annual growth rate more than doubled in the 2010 to 2014 period compared to 2000 to 2010, from 0.21 percent to 0.47 percent. The growth rate of New

[155] The East region comprises the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia, as well as the District of Columbia. Throughout the socioeconomics section, figures for the East region represent the sum of the values for all "states" (including the District of Columbia) in the region, or an average for the region based on summing the component parameters. For instance, the population density of the East region is the sum of the populations of all its states, divided by the sum of the land areas of all its states.

York in the latter period nearly matched the growth rate of the region, at 0.50 percent. Both geographies showed lower growth rates in both periods compared to the nation's growth rate of 0.81 percent.

Table 11.1.9-2: Recent Population Growth of New York

Geography	Population			Numerical Population Change		Rate of Population Change (AARC)[a]	
	2000	2010	2014 (estimated)	2000 to 2010	2010 to 2014	2000 to 2010	2010 to 2014
New York	18,976,457	19,378,102	19,746,227	401,645	368,125	0.21%	0.47%
East Region	69,133,382	72,444,467	73,899,862	3,311,085	1,455,395	0.47%	0.50%
United States	281,421,906	308,745,538	318,857,056	27,323,632	10,111,518	0.93%	0.81%

Sources: (U.S. Census Bureau, 2015s) (U.S. Census Bureau, 2015t)
[a] AARC = Average Annual Rate of Change (compound growth rate)

Demographers prepare future population projections using various population growth modeling methodologies. For this nationwide PEIS, it is important to use population projections that apply the same methodology across the nation. It is also useful to consider projections that use different methodologies, since no methodology is a perfect predictor of the future. The Census Bureau does not prepare population projections for the states. Therefore, Table 11.1.9-3 presents projections of the 2030 population from two sources that are national in scope and use different methodologies: the University of Virginia's Weldon Cooper Center for Public Service and ProximityOne, a private sector demographic and economic data and analysis service. The table provides figures for numerical change, percentage change, and annual growth rate based on averaging the projections from the two sources. The average projection indicates New York's population will increase by approximately 1.7 million people, or 8.5 percent, from 2014 to 2030. This reflects an average annual projected growth rate of 0.51 percent, which is very similar to the historical growth rate from 2010 to 2014 of 0.47 percent. The projected growth rate of the state is similar to that of the region (0.57 percent) and less than the projected growth rate of the nation (0.80 percent).

Table 11.1.9-3: Projected Population Growth of New York

Geography	Population 2014 (estimated)	Projected 2030 Population			Change Based on Average Projection		
		UVA Weldon Cooper Center Projection	Proximity One Projection	Average Projection	Numerical Change 2014 to 2030	Percent Change 2014 to 2030	Rate of Change (AARC)[a] 2014 to 2030
New York	19,746,227	20,446,062	22,414,984	21,430,523	1,684,296	8.5%	0.51%
East Region	73,899,862	78,925,282	82,842,294	80,883,788	6,983,926	9.5%	0.57%
United States	318,857,056	360,978,449	363,686,916	362,332,683	43,475,627	13.6%	0.80%

Sources: (U.S. Census Bureau, 2015t) (ProximityOne, 2015) (UVA Weldon Cooper Center, 2015)
[a] AARC = Average Annual Rate of Change (compound growth rate)

Population Distribution and Communities

Figure 11.1.9-1 presents the distribution and relative density of the population of New York. Each brown dot represents 500 people, and massing of dots indicates areas of higher population density – therefore, areas that are solid in color are particularly high in population density. The map uses ACS estimates based on samples taken from 2009 to 2013 (U.S. Census Bureau, 2015e).

This map also presents the 10 largest population concentrations in the state, outlined in purple. These population concentrations reflect contiguous, densely developed areas as defined by the Census Bureau based on the 2010 census (U.S. Census Bureau, 2015w; U.S. Census Bureau, 2015x). These population concentrations often include multiple incorporated areas as well as some unincorporated areas.

Other groupings of brown dots on Figure 11.1.9-1 represent additional, but smaller, population concentrations. Dispersed dots indicate dispersed population across the less densely settled areas of the state. The very sparsely populated area between Syracuse, Albany/Schenectady, and Plattsburgh is the Adirondack region, much of which the state has protected from development as part of the Adirondack State Park. For more information about the Adirondack State Park, see Section 11.1.7, Land Use, Recreation, and Airspace.

Table 11.1.9-4 provides the populations of the 10 largest population concentrations in New York, based on the 2010 census. It also shows the changes in population for these areas between the 2000 and 2010 censuses.[156] In 2010, the largest population concentration by far was the New York portion of the New York City/Newark area, which had over 12 million people. The state had no other population concentrations over 1 million. It had three areas with populations between 500,000 and 1 million, and four with populations between 100,000 and 500,000. The smallest of these 10 population concentrations was the Glens Falls area, with a 2010 population of 65,443. The fastest growing area, by average annual rate of change from 2000 to 2010, was the New York portion of the Poughkeepsie/Newburgh area, with an annual growth rate of 1.60 percent. The only other area with a growth rate over 1.00 percent was the Glens Falls area (1.28 percent). The Buffalo area experienced a population decline during this period.

Table 11.1.9-4 also shows that the top 10 population concentrations in New York accounted for over 80 percent of the state's population in 2010. Further, population growth in the 10 areas from 2000 to 2010 amounted to 105.9 percent of the entire state's growth. This figure of over 100 percent indicates that the population of the remainder of the state, as a whole, declined from 2000 to 2010.

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[156] Census Bureau boundaries for these areas are not fixed. Area changes from 2000 to 2010 may include accretion of newly developed areas into the population concentration, Census Bureau classification of a subarea as no longer qualifying as a concentrated population due to population losses, and reclassification by the Census Bureau of a subarea into a different population concentration. Thus, population change from 2000 to 2010 reflects change within the constant area and change as the overall area boundary changes. Differences in boundaries in some cases introduce anomalies in comparing the 2000 and 2010 populations and in calculation of the growth rate presented in the table.

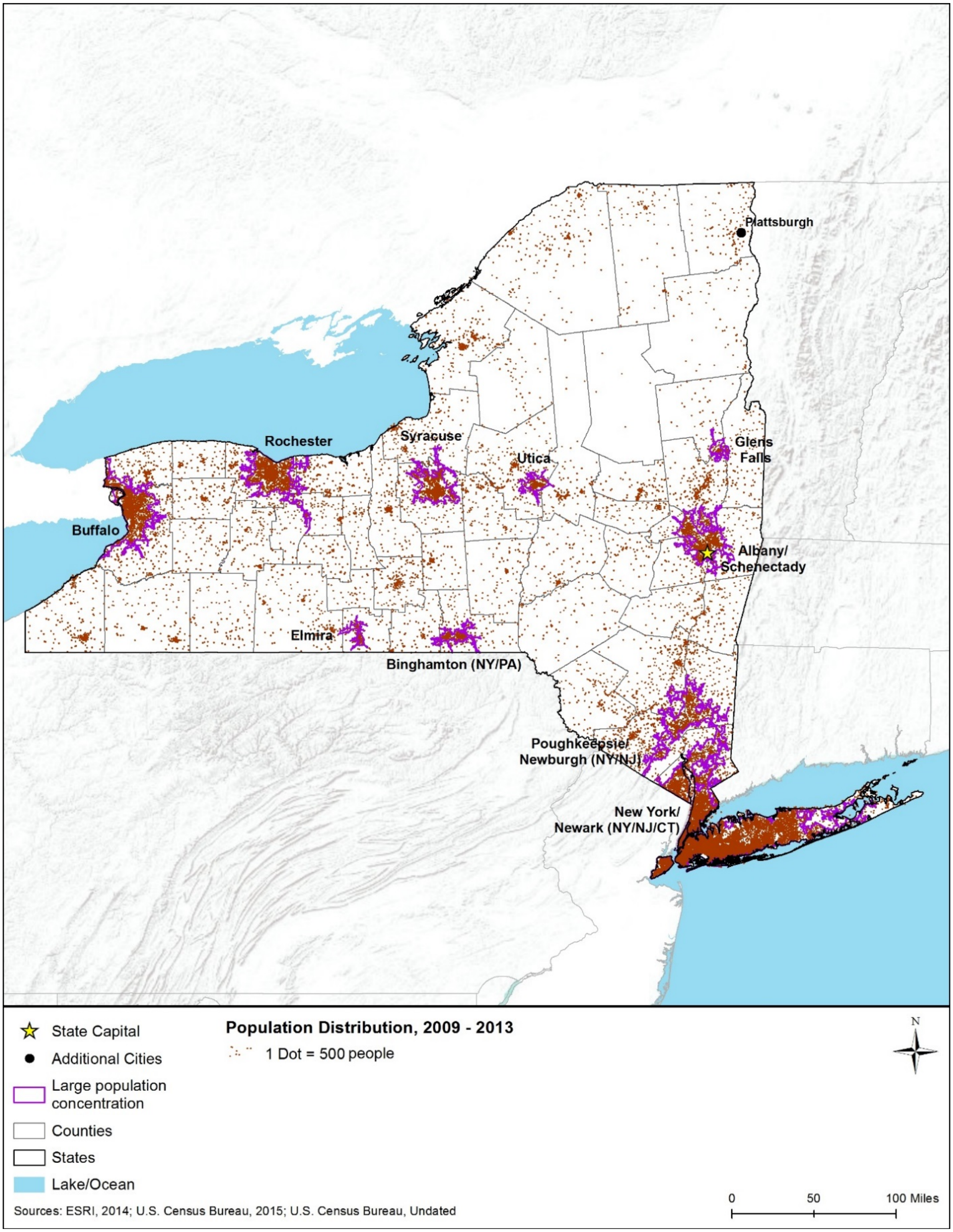

Figure 11.1.9-1: Population Distribution in New York, 2009–2013

Table 11.1.9-4: Population of the 10 Largest Population Concentrations in New York

Area	Population				Population Change 2000 to 2010	
	2000	2010	2009–2013	Rank in 2010	Numerical Change	Rate (AARC)[a]
Albany/Schenectady	558,947	594,962	597,992	4	36,015	0.63%
Binghamton (NY/PA) (NY Portion)	155,611	155,662	154,430	7	51	0.00%
Buffalo	976,703	935,906	936,213	2	(40,797)	-0.43%
Elmira	67,159	67,983	68,245	9	824	0.12%
Glens Falls	57,627	65,443	65,597	10	7,816	1.28%
New York/Newark (NY/NJ/CT) (NY Portion)	11,870,842	12,191,715	12,301,668	1	320,873	0.27%
Poughkeepsie/Newburgh (NY/NJ) (NY Portion)	351,982	412,338	413,199	5	60,356	1.60%
Rochester	694,396	720,572	721,575	3	26,176	0.37%
Syracuse	402,267	412,317	412,487	6	10,050	0.25%
Utica	113,409	117,328	116,869	8	3,919	0.34%
Total for Top 10 Population Concentrations	15,248,943	15,674,226	15,788,275	NA	425,283	0.28%
New York (statewide)	18,976,457	19,378,102	19,487,053	NA	401,645	0.21%
Top 10 Total as Percentage of State	80.4%	80.9%	81.0%	NA	105.9%	NA

Sources: (U.S. Census Bureau, 2015w; U.S. Census Bureau, 2015u; U.S. Census Bureau, 2015v)
[a] AARC = Average Annual Rate of Change (compound growth rate)

11.1.9.4 Economic Activity, Housing, Property Values, and Government Revenues

This section addresses other socioeconomic topics that are potentially relevant to FirstNet. These topics include:

- Economic activity,
- Housing,
- Property values, and
- Government revenues.

Social institutions – educational, family, political, public service, military, and religious – are present throughout the state. The institutions most relevant to FirstNet projects are public services such as medical and emergency medical services and facilities. This PEIS addresses public services in Section 11.1.1, Infrastructure. Project-level NEPA analyses may need to examine other institutions, depending on specific locations and specific types of actions.

Economic Activity

Table 11.1.9-5 compares several economic indicators for New York to the East region and the nation. The table presents two indicators of income[157] – per capita and median household – as income is a good measure of general economic health of a region.

Per capita income is total income divided by the total population. As a mathematical average, the very high incomes of a relatively small number of people tend to bias per capita income figures upwards. Nonetheless, per capita income is useful as an indicator of the relative income level across two or more areas. As shown in Table 11.1.9-5, the per capita income in New York in 2013 ($32,514) was $338 lower than that of the region ($32,852), and $4,330 higher than that of the nation ($28,184).

Household income is a useful measure, and often used instead of family income, because in modern society there are many single-person households and households composed of non-related individuals. Median household income (MHI) is the income at which half of all households have higher income, and half have lower income. Table 11.1.9-5 shows that in 2013, the MHI in New York ($57,255) was $3,249 lower than that of the region ($60,504), and $5,005 higher than that of the nation ($52,250).

Employment status is a key socioeconomic parameter because employment is essential to the income of a large portion of the adult population. The federal government calculates the unemployment rate as the number of unemployed individuals who are looking for work divided by the total number of individuals in the labor force. Table 11.1.9-5 compares the unemployment rate in New York to the East region and the nation. In 2014, New York's statewide unemployment rate of 6.3 percent was higher than the rate for the region (6.0 percent) and very similar to the rate for the nation (6.2 percent).[158]

Table 11.1.9-5: Selected Economic Indicators for New York

Geography	Per Capita Income 2013	Median Household Income 2013	Average Annual Unemployment Rate 2014
New York	$32,514	$57,255	6.3%
East Region	$32,852	$60,504	6.0%
United States	$28,184	$52,250	6.2%

Sources: (BLS, 2015b)

[157] The Census Bureau defines income as follows: "'Total income' is the sum of the amounts reported separately for wage or salary income; net self-employment income; interest, dividends, or net rental or royalty income or income from estates and trusts; Social Security or Railroad Retirement income; Supplemental Security Income (SSI); public assistance or welfare payments; retirement, survivor, or disability pensions; and all other income. Receipts from the following sources are not included as income: capital gains, money received from the sale of property (unless the recipient was engaged in the business of selling such property); the value of income "in kind" from food stamps, public housing subsidies, medical care, employer contributions for individuals, etc.; withdrawal of bank deposits; money borrowed; tax refunds; exchange of money between relatives living in the same household; gifts and lump-sum inheritances, insurance payments, and other types of lump-sum receipts." (U.S. Census Bureau, 2015q)

[158] The timeframe for unemployment rates can change quarterly.

Figure 11.1.9-2 and Figure 11.1.9-3 show how MHI in 2013 (U.S. Census Bureau, 2015f) and unemployment in 2014 (BLS, 2015c) varied by county across the state. These maps also incorporate the same population concentration data as Figure 11.1.9-1 (U.S. Census Bureau, 2012a; U.S. Census Bureau, 2015g). Following these two maps, Table 11.1.9-6 presents MHI and unemployment for the 10 largest population concentrations in the state. The table reflects survey data taken from 2009 to 2013. Thus, its figures are not directly comparable to those on the maps. Nonetheless, both the maps and the table help portray differences in income and unemployment across New York.

Figure 11.1.9-2 shows that, in general, counties with a MHI above the national median were located in the southern portions of the state and the Albany/Schenectady area. Most of the remainder of the state had MHI levels below the national average. In addition, two of New York City's boroughs, the Bronx and Brooklyn, had MHI levels below the national average. Table 11.1.9-6 is consistent with those observations. It shows that MHI in the broad New York City area (the New York portions of the New York/Newark and Poughkeepsie/Newburgh areas), and in the Albany/Schenectady area, was above the state average. MHI in all other population concentrations was below the state average. MHI was lowest in the Utica, Binghamton, and Elmira areas. These are the second, third, and fourth smallest of the areas shown in the table. The smallest area, Glens Falls, had a considerably higher MHI compared to the three just-mentioned areas, probably reflecting its proximity to the high-income Albany/Schenectady area.

Figure 11.1.9-3 presents variations in the 2014 unemployment rate across the state, by county. It shows that counties with unemployment rates below the national average (that is, better employment performance) were distributed throughout most of the state. However, all of the northernmost counties had unemployment rates above the national average, as did all of the New York City boroughs except Manhattan. The lowest unemployment rates were generally in the counties around Albany/Schenectady, and some counties around New York City. When comparing unemployment in the population concentrations to the state average (Table 11.1.9-6), only the New York portion of the Poughkeepsie/Newburgh area had a 2009–2013 unemployment rate that was higher than the state average. This indicates that employment conditions in this highly populated area dominated the state average.

Detailed employment data provides useful insights into the nature of a local, state, or national economy. Table 11.1.9-7 provides figures on employment percentages by type of worker and by industry based on surveys conducted in 2013 by the Census Bureau. By class of worker (type of worker: private industry, government, self-employed, etc.), the percentage of private wage and salary workers was somewhat lower in New York than in the East region and the nation. The percentage of government workers was higher in the state than in the region and nation. Self-employed workers were a similar percentage in the state as the nation.

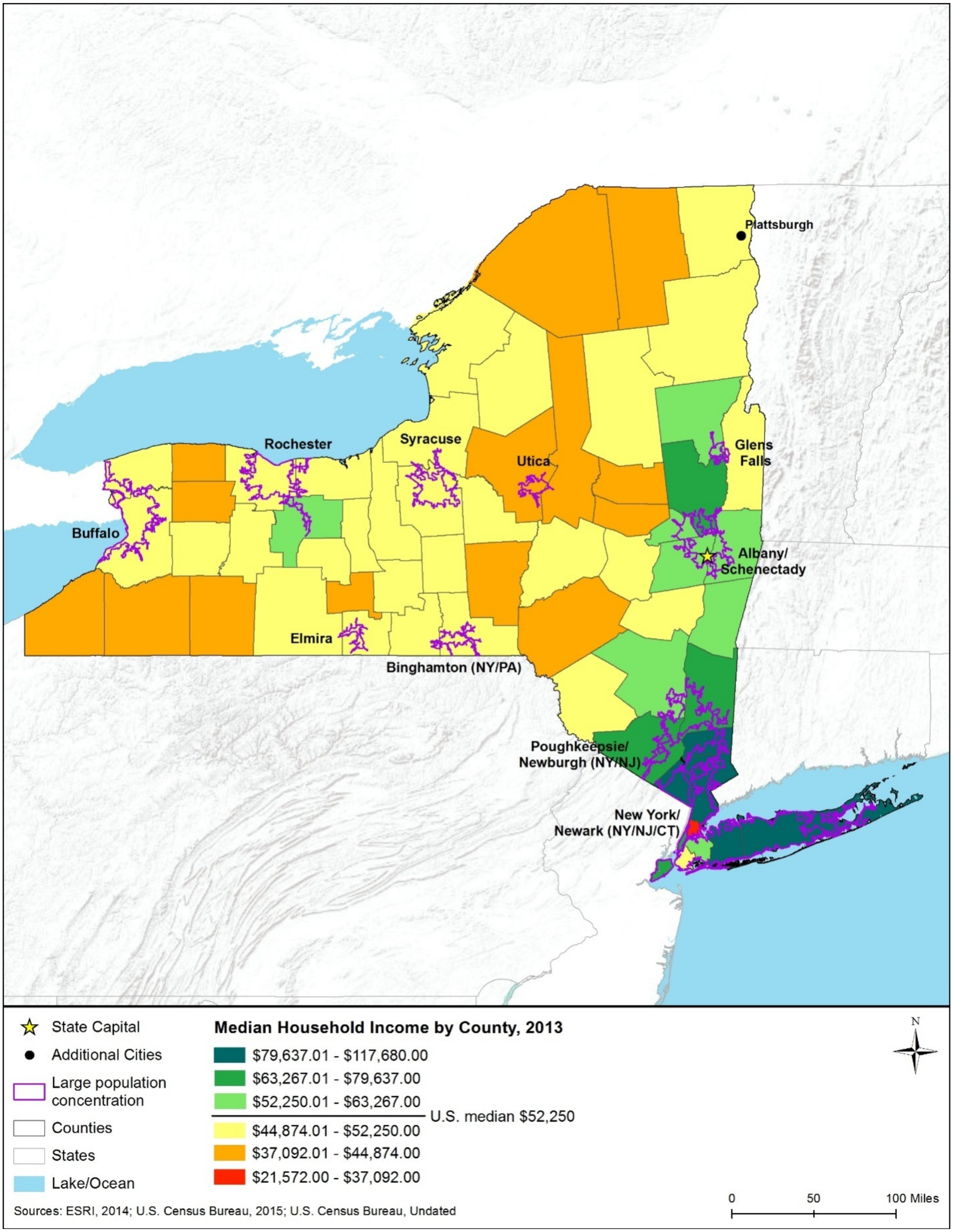

Figure 11.1.9-2: Median Household Income in New York, by County, 2013

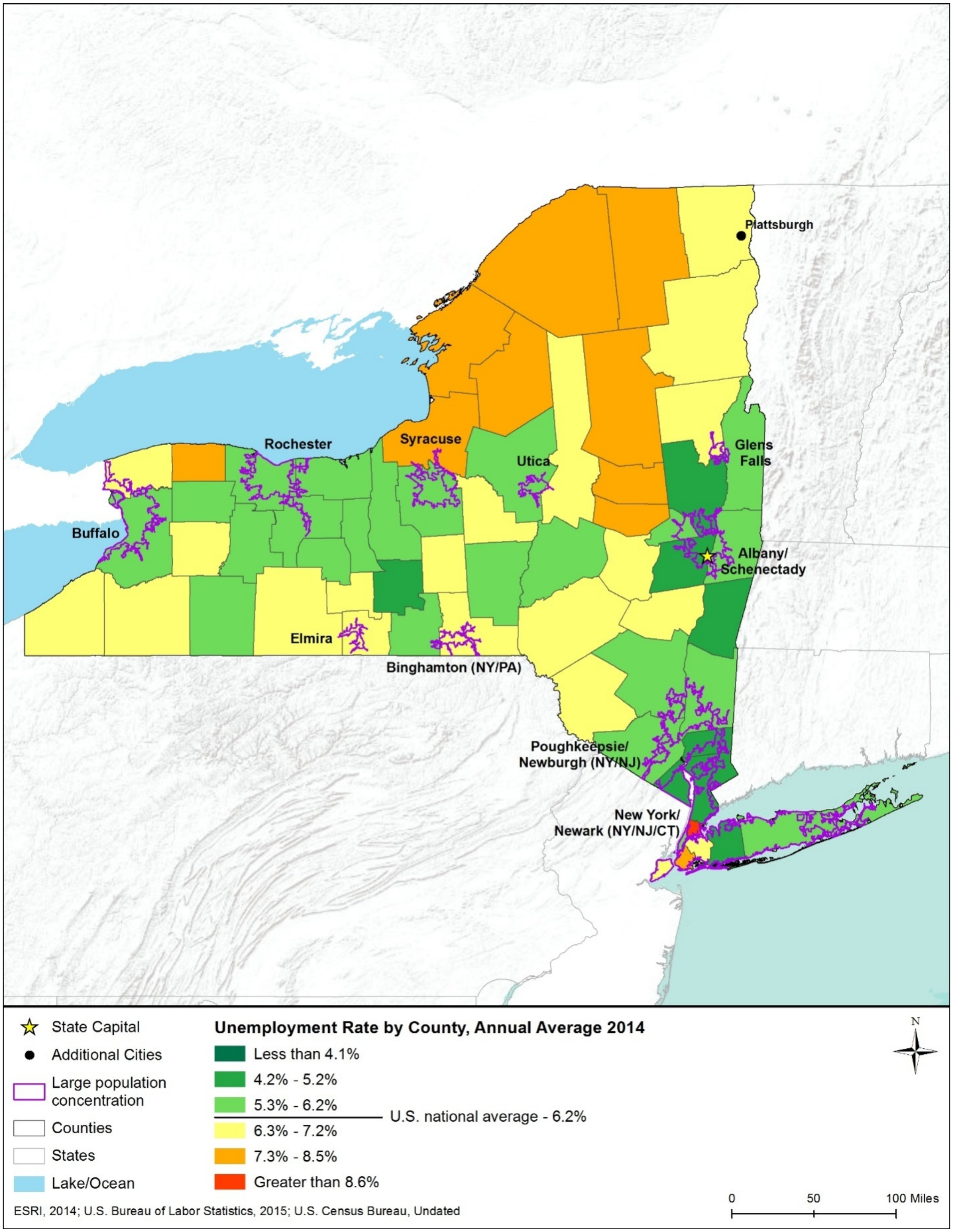

Figure 11.1.9-3: Unemployment Rates in New York, by County, 2014

By industry, New York has a mixed economic base and some notable figures in the table are as follows. New York in 2013 had a considerably lower percentage of persons working in manufacturing than did the region or the nation. It had a higher percentage of workers in "finance and insurance, and real estate and rental and leasing" than the region or nation. It also had a considerably higher percentage in "educational services, and health care and social assistance" than the region or nation.

Table 11.1.9-6: Selected Economic Indicators for the 10 Largest Population Concentrations in New York, 2009–2013

Area	Median Household Income	Average Annual Unemployment Rate
Albany/Schenectady	$58,915	7.7%
Binghamton (NY/PA) (NY Portion)	$43,685	8.9%
Buffalo	$48,287	8.9%
Elmira	$44,202	7.9%
Glens Falls	$52,574	8.2%
New York/Newark (NY/NJ/CT) (NY Portion)	$62,041	9.7%
Poughkeepsie/Newburgh (NY/NJ) (NY Portion)	$69,704	8.8%
Rochester	$51,294	8.4%
Syracuse	$51,539	8.3%
Utica	$42,589	9.1%
New York (statewide)	$58,003	9.2%

Source: (U.S. Census Bureau, 2015h)

Table 11.1.9-7: Employment by Class of Worker and by Industry, 2013

Class of Worker and Industry	New York	East Region	United States
Civilian Employed Population 16 Years and Over	9,213,552	35,284,908	145,128,676
Percentage by Class of Worker			
Private wage and salary workers	78.5%	79.3%	79.7%
Government workers	15.4%	15.1%	14.1%
Self-employed in own not incorporated business workers	5.9%	5.4%	6.0%
Unpaid family workers	0.2%	0.1%	0.2%
Percentage by Industry			
Agriculture, forestry, fishing and hunting, and mining	0.6%	0.9%	2.0%
Construction	5.6%	5.8%	6.2%
Manufacturing	6.6%	8.5%	10.5%
Wholesale trade	2.5%	2.5%	2.7%
Retail trade	10.7%	11.1%	11.6%
Transportation and warehousing, and utilities	4.9%	4.6%	4.9%
Information	2.9%	2.3%	2.1%
Finance and insurance, and real estate and rental and leasing	8.1%	7.3%	6.6%
Professional, scientific, management, administrative, and waste management services	11.7%	12.3%	11.1%
Educational services, and health care and social assistance	27.3%	25.6%	23.0%
Arts, entertainment, and recreation, and accommodation and food services	9.5%	8.9%	9.7%
Other services, except public administration	5.0%	4.9%	5.0%

Class of Worker and Industry	New York	East Region	United States
Public administration	4.5%	5.5%	4.7%

Source: (U.S. Census Bureau, 2015i)

Table 11.1.9-8 presents employment shares for selected industries for the 10 largest population concentrations in the state. The table reflects survey data taken by the Census Bureau from 2009 to 2013. Thus, its figures for the state are slightly different from those in Table 11.1.9-7 for 2013. The selected industries are those with the greatest potential to be affected by FirstNet projects. Specifically, they are industries that may be involved in real estate transactions for FirstNet infrastructure, and in the design, deployment, and management of that infrastructure. In most of the 10 areas, the percentage of employment in the "Construction" industry was lower than the state average (5.6 percent), but in all cases was within two percentage points of the state average.

Table 11.1.9-8: Employment by Relevant Industries for the 10 Largest Population Concentrations in New York, 2009–2013

Area	Construction	Transportation and Warehousing, and Utilities	Information	Professional, Scientific, Management, Administrative and Waste Management Services
Albany/ Schenectady	4.6%	3.9%	2.0%	10.3%
Binghamton (NY/PA) (NY Portion)	4.9%	3.1%	1.6%	9.4%
Buffalo	3.9%	4.7%	1.7%	9.7%
Elmira	4.7%	3.2%	1.6%	6.4%
Glens Falls	5.8%	2.7%	2.4%	6.9%
New York/Newark (NY/NY/CT) (NY Portion)	5.4%	5.5%	3.5%	12.5%
Poughkeepsie/ Newburgh (NY/NJ) (NY Portion)	5.8%	5.5%	2.2%	9.9%
Rochester	4.1%	3.3%	2.5%	11.5%
Syracuse	4.4%	4.9%	2.3%	10.0%
Utica	4.3%	3.0%	1.4%	6.6%
New York (statewide)	5.6%	5.1%	2.9%	11.1%

Source: (U.S. Census Bureau, 2015h)

Housing

The housing stock is an important socioeconomic component of communities. The type, availability, and cost of housing in an area reflect economic conditions and affect quality of life. Table 11.1.9-9 compares New York to the East region and nation on several common housing indicators.

As shown in Table 11.1.9-9, in 2013 New York had a higher percentage of housing units that were occupied (88.8 percent) than the region (88.4 percent) or nation (87.5 percent). Of the occupied units, New York had a considerably lower percentage of owner-occupied units (53.7 percent) than the region (62.8 percent) or nation (63.5 percent). The lower owner-occupied rate was probably due to large numbers of apartment and other rental units in the highly developed areas of the state. This is reflected in the lower percentage of detached single-unit housing (also known as single-family homes) in New York in 2013 (41.8 percent) compared to the region (52.7 percent) and nation (61.5 percent) (U.S. Census Bureau, 2015j). The vacancy rate among rental units was lower in New York (4.2 percent) than in the region (5.5 percent) or nation (6.5 percent).

Table 11.1.9-9: Selected Housing Indicators for New York, 2013

Geography	Total Housing Units	Housing Occupancy & Tenure				Units in Structure
		Occupied Housing	Owner-Occupied	Homeowner Vacancy Rate	Rental Vacancy Rate	1-Unit, Detached
New York	8,126,399	88.8%	53.7%	1.6%	4.2%	41.8%
East Region	31,108,124	88.4%	62.8%	1.6%	5.5%	52.7%
United States	132,808,137	87.5%	63.5%	1.9%	6.5%	61.5%

Source: (U.S. Census Bureau, 2015k)

Table 11.1.9-10 provides housing indicators for the largest population concentrations in the state. The table reflects survey data taken from 2009 to 2013. Thus, its figures are not directly comparable to the more recent data in the previous table. However, it does present variation in these indicators for population concentrations across the state and compared to the state average for the 2009 to 2013 period.

As shown in this table, during this period the percentage of occupied housing units ranged between 88.8 to 93.0 percent across these population concentrations, which is consistent with the state percentage (89.2 percent). The Elmira area had the highest percentage of occupied housing units (93.0 percent) and the Binghamton area (New York portion) had the lowest percentage of owner-occupied units (88.8 percent). In these 10 communities, the percentage of occupied housing units that were owner-occupied ranged from 45.4 percent (New York City/Newark area, New York portion) to 66.8 percent (Poughkeepsie/Newburgh area, New York portion). The highest rental vacancy rate occurred in the Binghamton area (New York portion, 6.8 percent).

Table 11.1.9-10: Selected Housing Indicators for the 10 Largest Population Concentrations in New York, 2009–2013

Area	Total Housing Units	Housing Occupancy & Tenure				Units in Structure
		Occupied Housing	Owner-Occupied	Homeowner Vacancy Rate	Rental Vacancy Rate	1-Unit, Detached
Albany/Schenectady	266,397	89.1%	59.9%	1.6%	5.1%	50.5%

Area	Total Housing Units	Housing Occupancy & Tenure				Units in Structure
		Occupied Housing	Owner-Occupied	Homeowner Vacancy Rate	Rental Vacancy Rate	1-Unit, Detached
Binghamton (NY/ PA) (NY Portion)	70,701	88.8%	61.3%	2.6%	6.8%	56.6%
Buffalo	436,435	89.9%	63.6%	1.6%	6.7%	56.3%
Elmira	29,504	93.0%	61.1%	1.4%	3.5%	62.2%
Glens Falls	30,185	92.0%	63.6%	2.2%	4.7%	60.2%
New York/Newark (NY/NJ/CT) (NY Portion)	4,828,597	91.6%	45.3%	1.9%	4.0%	26.9%
Poughkeepsie/Newburgh (NY/NJ) (NY Portion)	156,219	91.6%	66.8%	2.0%	6.5%	56.7%
Rochester	314,016	92.5%	63.7%	1.2%	6.5%	61.7%
Syracuse	179,391	91.5%	62.3%	1.8%	5.8%	59.1%
Utica	50,760	89.0%	59.7%	1.2%	5.9%	52.3%
New York (statewide)	8,113,270	89.2%	54.2%	1.8%	4.5%	42.0%

Source: (U.S. Census Bureau, 2015l)

Property Values

Property values have important relationships to both the wealth and affordability of communities. Table 11.1.9-11 provides indicators of residential property values for New York and compares these values to values for the East region and nation. The figures on median value of owner-occupied units are from the Census Bureau's ACS, based on owner estimates of how much their property (housing unit and land) would sell for if it were for sale (U.S. Census Bureau, 2015j). The table shows that the median value of owner-occupied units in New York in 2013 ($277,600) was higher than the corresponding values for the East region ($249,074) and the nation ($173,900).

Table 11.1.9-11: Residential Property Values in New York, 2013

Geography	Median Value of Owner-Occupied Units
New York	$277,600
East Region	$249,074
United States	$173,900

Source: (U.S. Census Bureau, 2015j)

Table 11.1.9-12 presents residential property values for the largest population concentrations in the state. The table reflects survey data taken from 2009 to 2013. Thus, its figures are not directly comparable to the more recent data in the previous table. However, it does show variation in property values for population concentrations across the state and compared to the state average for the 2009 to 2013 period. Only the New York portion of the New York/Newark area had a median value higher than the state median value ($455,400 compared to $288,200). The nearby Poughkeepsie/Newburgh area (New York portion) had a median property value close to the state value. All other population concentrations had property values considerably below the state value. This indicates that the New York/Newark area (New York portion), due to its size, dominates the state median value. The lowest values were in the same three areas – Elmira, Utica, and Binghamton – that had the lowest median household incomes (Table 11.1.9-12).

Table 11.1.9-12: Residential Property Values for the 10 Largest Population Concentrations in New York, 2009–2013

Area	Median Value of Owner-Occupied Units
Albany/Schenectady	$195,000
Binghamton (NY/PA) (NY Portion)	$107,200
Buffalo	$116,900
Elmira	$89,500
Glens Falls	$164,300
New York/Newark (NJ/CT) (NY Portion)	$455,400
Poughkeepsie/Newburgh (NY/NJ) (NY Portion)	$279,700
Rochester	$135,500
Syracuse	$126,300
Utica	$106,800
New York (statewide)	$288,200

Sources: (U.S. Census Bureau, 2015l)

Government Revenues

State and local governments obtain revenues from many sources. FirstNet projects may affect flows of these revenue sources between different levels of government due to program financing and intergovernmental agreements for system development and operation. Table 11.1.9-13 presents total and selected state and local government revenue sources as reported by Census Bureau's 2012 Census of Governments. It provides both total dollar figures (in millions of dollars) and figures per capita (in dollars), based on total population for each geography. The per capita figures are particularly useful in comparing the importance of certain revenue sources in the state relative to other states in the region and the nation. State and local governments may obtain some additional revenues related to telecommunications infrastructure.

General and selective sales taxes may change, reflecting expenditures during system development and maintenance. Public utility taxes[159] are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services (U.S. Census Bureau, 2006). These service providers may obtain new taxable revenues from operation of components of the public safety broadband network. These revenue streams are typically highly localized and therefore are best considered in the deployment phase of FirstNet.

Table 11.1.9-13 shows that state and local governments in New York received more revenue in 2012 on a per capita basis than their counterpart governments in the region and nation.

[159] Public utility taxes are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services. (U.S. Census Bureau, 2006)

Additionally, New York state and local governments had higher levels of intergovernmental revenues.[160] The New York state government obtained no revenue from property taxes. Local governments in New York obtained higher levels of property taxes per capita than local governments in the region or nation.

General sales taxes were similar on a per capita basis for the New York state government, and higher for New York local governments, compared to their counterparts in the region and nation. Selective sales taxes and public utility taxes specifically, were roughly similar on a per capita basis for New York, the region, and nation. Individual and corporate income tax revenues, on a per capita basis, were higher for New York state and local governments than for those governments in the region and nation.

Table 11.1.9-13: State and Local Government Revenues, Selected Sources, 2012

Type of Revenue	New York		Region		United States	
	State Govt. Amount	Local Govt. Amount	State Govt. Amount	Local Govt. Amount	State Govt. Amount	Local Govt. Amount
Total Revenue ($M)	$179,605	$171,847	$522,354	$431,898	$1,907,027	$1,615,194
Per capita	$9,177	$8,781	$7,132	$5,897	$6,075	$5,145
Intergovernmental from Federal ($M)	$48,699	$6,602	$135,435	$20,289	$514,139	$70,360
Per capita	$2,488	$337	$1,849	$277	$1,638	$224
Intergovernmental from State ($M)	$0	$48,565	$0	$120,274	$0	$469,147
Per capita	$0	$2,482	$0	$1,642	$0	$1,495
Intergovernmental from Local ($M)	$7,377	$0	$9,810	$0	$19,518	$0
Per capita	$377	$0	$134	$0	$62	$0
Property Taxes ($M)	$0	$47,577	$2,215	$144,319	$13,111	$432,989
Per capita	$0	$2,431	$30	$1,971	$42	$1,379
General Sales Taxes ($M)	$11,904	$13,030	$49,123	$15,874	$245,446	$69,350
Per capita	$608	$666	$671	$217	$782	$221
Selective Sales Taxes ($M)	$10,965	$2,204	$38,070	$5,996	$133,098	$28,553
Per capita	$560	$113	$520	$82	$424	$91
Public Utilities Taxes ($M)	$943	$844	$4,314	$2,261	$14,564	$14,105
Per capita	$48	$43	$59	$31	$46	$45
Individual Income Taxes ($M)	$38,772	$8,720	$102,813	$18,838	$280,693	$26,642
Per capita	$1,981	$446	$1,404	$257	$894	$85
Corporate Income Taxes ($M)	$4,568	$5,956	$14,112	$6,733	$41,821	$7,210
Per capita	$233	$304	$193	$92	$133	$23

Sources: (U.S. Census Bureau 2015q, U.S. Census Bureau 2015r)

Public utility taxes are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services (U.S. Census Bureau, 2006).
Note: This table does not include all sources of government revenue. Summation of the specific source rows does not equal total revenue.

[160] Intergovernmental revenues are those revenues received from the federal government or other government entities such as shared taxes, grants, or loans and advances.

11.1.10 Environmental Justice

11.1.10.1 Definition of the Resource

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, issued in 1994, sets out principles of environmental justice and requirements that federal agencies should follow to comply with the EO. The fundamental principle of environmental justice, as stated in the EO is, "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (Executive Office of the President, 1994). Under the EO, each federal agency must "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (Executive Office of the President, 1994). In response to the EO, the Department of Commerce developed an Environmental Justice Strategy in 1995, and published an updated strategy in 2013 (DOC, 2013b).

In 1997, the Council on Environmental Quality (CEQ) issued Environmental Justice: Guidance under the National Environmental Policy Act (NEPA) to assist federal agencies in meeting the requirements of the EO (CEQ, 1997). Additionally, the USEPA Office of Environmental Justice (USEPA, 2015y) offers guidance on Environmental Justice issues and provides an "environmental justice screening and mapping tool, EJSCREEN" (USEPA, 2015aa).

The CEQ guidance provides several important definitions and clarifications that this PEIS utilizes:

- Minority populations consist of "Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic."
- Low-income populations consist of individuals living in poverty, as defined by the U.S. Census Bureau (Census Bureau).
- Environmental effects include social and economic effects. Specifically, "Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment" (CEQ, 1997).

11.1.10.2 Specific Regulatory Considerations

New York's first Environmental Justice program was established by the NYSDEC in 1999. In parallel with developments at the federal level, NYSDEC's Office of Environmental Justice issued several internal policies to establish criteria and guidance on how to take into consideration the impacts to vulnerable communities (environmental justice populations) when carrying out their responsibilities (NYSDEC, 2015ca). In 2003, NYSDEC issued Commissioner Policy (CP) -29, Commissioner Policy on Environmental Justice and Permitting, formally adopting the USEPA's definition of Environmental Justice and establishing protocols and guidance for integrating environmental justice assessments into the permitting review process. CP-29 also served to formalize environmental justice consideration through the State Environmental Quality Review Act, and incorporated "environmental justice concerns into some aspects of the NYSDEC's enforcement program, grants program, and public participation provisions" (NYSDEC, 2003).

CP-29 introduced the concept of Potential Environmental Justice Areas and provided environmental justice guidance to applicants with proposed projects in vulnerable communities. This policy also helped establish requirements for projects with the potential for significant adverse impacts in those communities (NYSDEC, 2009).

11.1.10.3 Environmental Setting: Minority and Low-Income Populations

Table 11.1.10-1 presents 2013 data on the composition of New York's population by race and by Hispanic origin. The state's population has higher percentages of individuals who identify as Black/African American (15.7 percent), Asian (8.5 percent), or Some Other Race (8.5 percent) than the populations of the East region and the nation. (Those percentages are, for Black/African American, 14.4 percent for the East region and 12.6 percent for the nation; for Asian, 5.8 percent and 5.1 percent respectively; and for Some Other Race, 4.8 percent and 4.7 percent respectively.) The state's population of persons identifying as White (64.4 percent) is considerably smaller than that of the East region (72.1 percent) or the nation (73.7 percent).

The percentage of the population in New York that identifies as Hispanic (18.4 percent) is considerably larger than in the East region (12.2 percent), and somewhat higher than in the nation (17.1 percent). Hispanic origin is a different category than race; persons of any race may identify as also being of Hispanic origin.

The category All Minorities consists of all persons who consider themselves Hispanic or of any race other than White. New York's All Minorities population percentage (43.1 percent) is considerably higher than that of the East region (34.0 percent) or the nation (37.6 percent).

Table 11.1.10-2 presents the percentage of the population living in poverty in 2013, for the state, region, and nation. The figure for New York (16.0 percent) is substantially higher than that for the East region (13.3 percent) and slightly higher than the figure for the nation (15.8 percent).

Table 11.1.10-1: Population by Race and Hispanic Status, 2013

Geography	Total Population (estimated)	Race								All Minor -ities[a]
		White	Black/ African Am.	Am. Indian/ Alaska Native	Asian	Native Hawaiian /Pacific Islander	Other Race	Two or More Races	Hispanic	
New York	19,651,127	64.6%	15.7%	0.4%	7.9%	0.1%	8.5%	2.9%	18.4%	43.1%
East Region	73,558,794	72.1%	14.4%	0.3%	5.8%	0.0%	4.8%	2.7%	12.2%	34.0%
United States	316,128,839	73.7%	12.6%	0.8%	5.1%	0.2%	4.7%	3.0%	17.1%	37.6%

Source: (U.S. Census Bureau, 2015m)

[a] "All Minorities" is defined as all persons who consider themselves Hispanic or of any race other than White. Because some Hispanics identify as both Hispanic and of a non-White race, "All Minorities" is less than the sum of Hispanics and non-White races.

Table 11.1.10-2: Percentage of Population (Individuals) in Poverty, 2013

Geography	Percent Below Poverty Level
New York	16.0%
East Region	13.3%
United States	15.8%

Source: (U.S. Census Bureau, 2015n)

11.1.10.4 Environmental Justice Screening Results

Analysis of environmental justice in a NEPA document typically begins by identifying potential environmental justice populations in the project area. Appendix D, Environmental Justice Methodology, presents the methodology used in this PEIS to screen each state for the presence of potential environmental justice populations. The methodology builds on CEQ guidance and best practices used for environmental justice analysis. It uses data at the census-block group level; block groups are the smallest geographic units for which regularly updated socioeconomic data are readily available at the time of writing.

Figure 11.1.10-1 visually portrays the results of the environmental justice population screening analysis for New York. The analysis used block group data from the Census Bureau's American Community Survey 2009-2013 5-Year Estimates (U.S. Census Bureau, 2015m) (U.S. Census Bureau, 2015o) (U.S. Census Bureau, 2015p) and Census Bureau urban classification data (U.S. Census Bureau, 2012q) (U.S. Census Bureau, 2015o).

Figure 11.1.10-1 shows that New York has many areas with High Potential for environmental justice populations. The distribution of these high potential areas is fairly even across the state, and occurs both within and outside of the 10 largest population concentrations. This includes some of the state's most sparsely populated areas, such as areas north of Syracuse, Utica, and Glens Falls; areas west of Elmira; and areas between Binghamton, Albany/Schenectady, and Poughkeepsie/Newburgh. The distribution of areas with moderate potential for environmental justice populations is also fairly even across the state.

It is important to understand how the data behind Figure 11.1.10-1 affect the visual impact of this map. Block groups have similar populations (hundreds to a few thousand individuals) regardless of population density. In sparsely populated areas, a single block group may cover tens or even hundreds of square miles, while in densely populated areas, block groups each cover much less than a single square mile. Thus, while large portions of the state outside the areas defined as large population concentrations show moderate or high potential for environmental justice populations, these low density areas reflect modest numbers of minority or low-income individuals compared to the potential environmental justice populations within densely populated areas. The overall effect of this relative density phenomenon is that the map visually shows large areas of the state having environmental justice potential, but this over-represents the presence of environmental justice populations.

It is also very important to note that Figure 11.1.10-1 does not definitively identify environmental justice populations. It indicates degrees of likelihood of the presence of populations of potential concern from an environmental justice perspective. Two caveats are important. First, environmental justice communities are often highly localized. Block group data may under- or over-represent the presence of these localized communities. For instance, in the large block groups in sparsely populated regions of the state, the data may represent dispersed individuals of minority or low-income status rather than discrete, place-based communities. Second, the definition of the Moderate Potential category draws a wide net for potential environmental justice populations. As discussed in Appendix D, the definition includes some commonly used thresholds for environmental justice screening that tend to over-identify environmental justice potential. Before FirstNet deploys projects, additional site-specific analyses to identify specific, localized environmental justice populations may be warranted. Such analyses could tier-off the methodology of this PEIS.

This map also does not indicate whether FirstNet projects would have actual impacts on environmental justice populations. An environmental justice effect on minority or low-income populations only occurs if the effect is harmful, significant (according to NEPA criteria), and "appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group" (CEQ, 1997). The Environmental Consequences section (Section 11.2.10) addresses the potential for disproportionately high and adverse environmental or human health impacts on environmental justice populations.

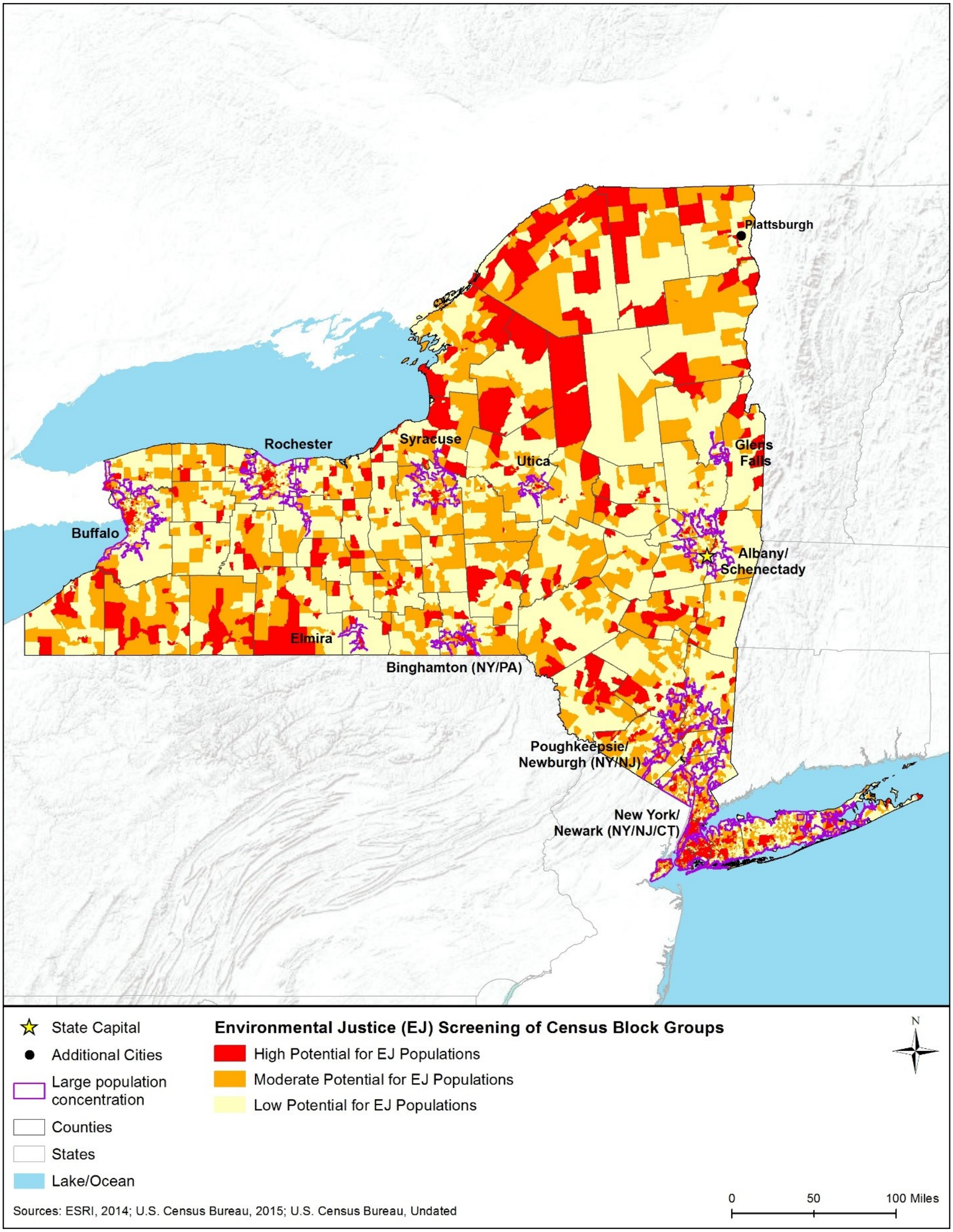

Figure 11.1.10-1: Potential for Environmental Justice Populations in New York, 2009–2013

11.1.11 Cultural Resources

11.1.11.1 Definition of Resource

For the purposes of this PEIS, Cultural Resources are defined as:

> Natural or manmade structures, objects, features, locations with scientific, historic, and cultural value, including those with traditional religious or cultural importance and any prehistoric or historic district, site, or building included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

This definition is consistent with the how cultural resources are defined in the:

- Statutory language and implementing regulations for Section 106 of the NHPA, as amended, formerly 16 U.S.C. 470a(d)(6)(A) (now 54 U.S.C. 306131(b)) and 36 CFR 800.16(l)(1);
- Statutory language and Implementing regulations for the Archaeological Resources Protection Act of 1979 (ARPA), 16 U.S.C. 470cc(c) and 43 CFR 7.3(a);
- The statutory language and implementing regulations for the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001(3)(D) and 43 CFR 10.2(d);
- NPS's program support of public and private efforts to identify, evaluate, and protect America's historic and archeological resources (NPS, 2015o);
- Advisory Council on Historic Preservation's (ACHP) guidance for protection and preservation of sites and artifacts with traditional religious and cultural importance to Indian tribes or Native Hawaiian organizations (Advisory Council on Historic Preservation, 2004);
- New York's State Historic Preservation Office (SHPO); and
- New York State Museum (New York State Museum, 2015).

11.1.11.2 Specific Regulatory Consideration

The Proposed Action must meet the requirements of NEPA and other applicable laws and regulations. Applicable federal laws and regulations that apply to Cultural Resources, such as the NHPA (detailed in Section 1.8), the American Indian Religious Freedom Act (AIRFA), ARPA, and NAGPRA. Appendix C summarizes these pertinent federal laws.

New York has state laws and regulations that parallel both NEPA and the NHPA (refer to Table 11.1.11-1). However, federal laws and regulations supersede those of the state. While federal agencies may take into account compatible state laws and regulations, their actions that are subject to federal environmental review under NEPA and NHPA are not subject to compliance with such state laws and regulations.

Table 11.1.11-1: Relevant New York Cultural Resources Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
New York State Historic Preservation Act of 1980, Section 14.09	New York SHPO	State agencies must consult with the SHPO for projects that may or will cause any change (beneficial or adverse) to any historic, architectural, archeological or cultural property that NRHP-listed or listed on the State Register or determined to be State eligible for listing.
State Environmental Quality Review Act (SEQRA)	NYSDEC	State NEPA-like regulations for state, county, and local governmental agencies to consider potential environmental impacts into project planning and reviews; requires consideration of impacts to historic resources, such as buildings listed on the NRHP or State Registers and archeological sites.

Source: (New York State Historic Preservation Office, 2015)

11.1.11.3 Cultural and Natural Setting

The New York region has been inhabited by human beings for some 12,000 years (Cantwell & diZerega Wall, 2001; Haynes, Johnson, & Stafford, 1999; Pauketat, 2012). However, due to a relatively wet climate that degrades and moves artifacts, the state's archaeological record is less reliable than that of more arid parts of the United States (Ritchie, 1969). The majority of New York's early human habitation evidence comes from the study of archeological sites of pre-European contact. In addition to the hundreds of archaeological sites listed in the state’s inventory, there are 78 archaeological sites and archaeological districts listed on the NRHP in New York, of which there are 19 prehistoric archaeological sites, 43 historic archaeological sites, nine shipwreck archaeological sites, one gunboat archaeological site, and six archaeological district (NPS, 2014d).

Archaeologists typically divide large study areas into regions, and in New York, they have adopted the New York State Parks regions as appropriate study areas, as shown in Figure 11.1.11-1 (http://www.nysparks.com/parks/). Regions 6a and 6b are highlighted because the entire land area is part of the New York State Parks system. The Adirondacks Region (6a) encompasses about one third of the state, and consists of mountains, lakes, streams, and the coastline of Lake Champlain. The Catskills Region (6b) represent one of the most biologically diverse areas in the eastern United States. The Adirondacks and Catskills Regions are particularly rich in historic and pre-European archeological sites because they were not extensively developed. (New York Office of Parks, Recreation, and Historic Preservation, 2015w) (New York Office of Parks, Recreation, and Historic Preservation, 2015x) (Figure 11.1.11-1).

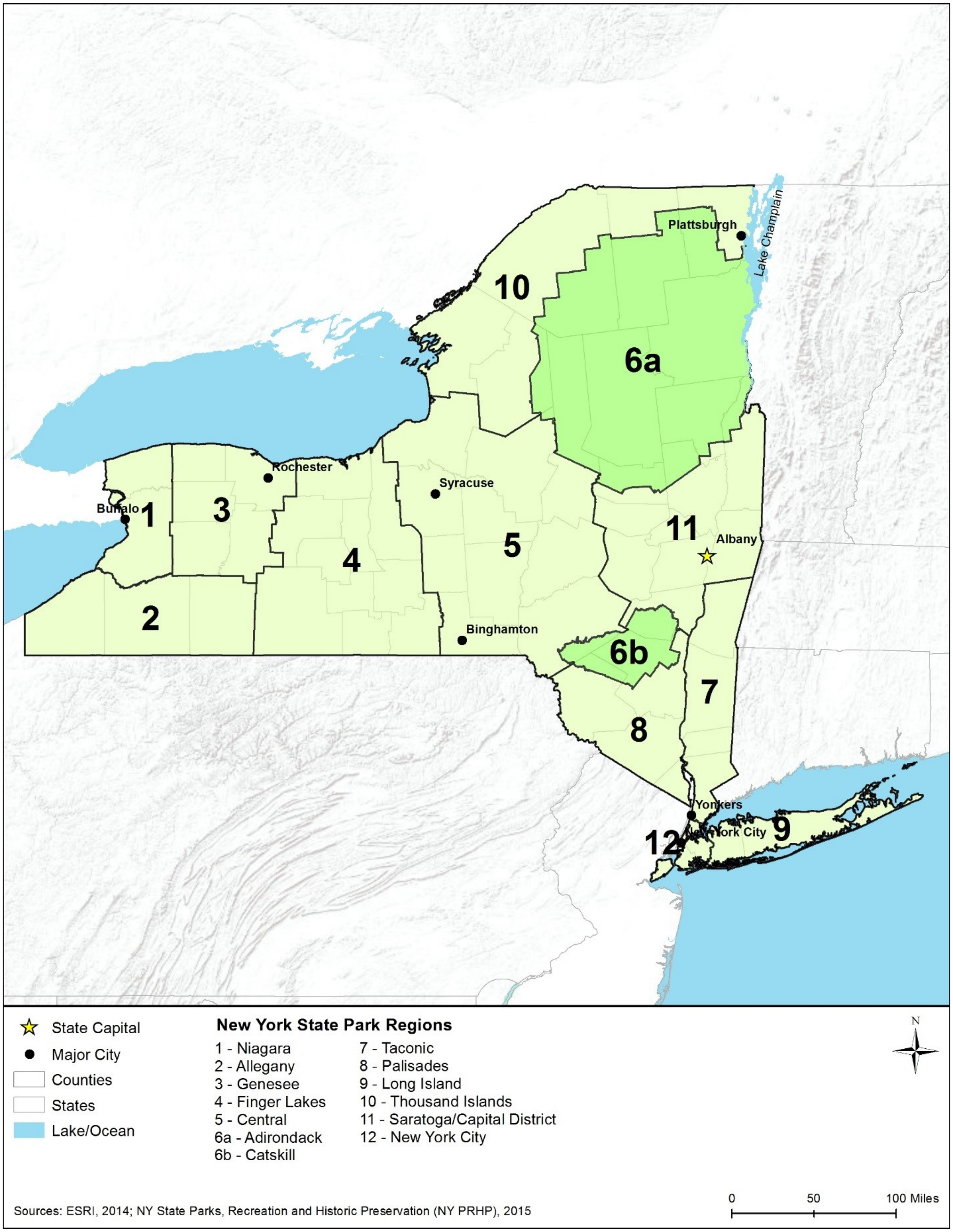

Figure 11.1.11-1: New York State Park Regions

New York's pre-historic archeological sites range from small temporary fishing camps to large permanent villages. "Resource procurement sites" from the prehistoric periods include areas where human activity may have consisted of a single action lasting for perhaps just a few hours, such as a hunting site where animals have been killed and butchered. Other sites have evidence of longer occupation, such as waterfront locations where groups of people regularly gathered to catch and prepare fish and shellfish (New York State Museum and Science Memoir 20, 1973; Lightfoot & Cerrato, 1988).

Evidence at most archeological sites in New York is found in relatively shallow deposits, within one to two feet of the surface. However, in some cases, natural factors have buried sites beneath multiple layers of sediment or organic materials, such as in floodplain deposits found along streams and rivers and peat deposits in wetlands. These deposits can range between one and ten feet below the current surface, with older sites in the deeper sediments. Disturbed ground, including urban areas, may contain archaeological resources in deeper or shallower strata than undisturbed areas (Harris, 1979).

Prior to 1970, professional archaeologists did limited excavations in in New York City. During the late 1970s, contract archaeology became common practice at construction sites and many archaeological artifacts and sites were discovered. The first archaeological "test case" in New York City was the Stadt Huys Block Project in Manhattan's financial district, which revealed large amounts of information about seventeenth-century Dutch New Amsterdam (Cantwell & diZerega Wall, 2001). Since this project, many more colonial period and later archaeological sites have been found throughout New York City, as well as in Albany, Kingston, and Elmira. Archeological sites across New York "document practically every aspect of the historic period, from 16th and 17th century Native American and early European settlements, to 20th century Cold War military installations." (New York Office of Parks, Recreation, and Historic Preservation, 2015w) Many of the most prominent historic period sites in New York are associated with colonial America and the Revolutionary War (New York Office of Parks, Recreation, and Historic Preservation, 2015y) (Cantwell & diZerega Wall, 2001).

New York also has a large collection of historic maritime resources. These resources include many archeological sites from the early 19th century expansion, such as the remains of early waterfronts, docks, and shipwrecks (New York Office of Parks, Recreation, and Historic Preservation, 2015y).

There are three distinct periods associated with the prehistoric human populations that inhabited present day New York and the greater Northeast geography of North America: The Paleoindian period (12,000 to 10,000 B.C.), Archaic (11,000 to 3,000 B.C.), and Woodland (3,000 B.C. to A.D. 1600) (Pauketat, 2012; Institute of Maritime History, 2015; Holiday, Johnson, & Stafford, 1999). Figure 11.1.11-2 shows a timeline representing these periods of early human habitation in North America, including present day New York. It is important to note that there is potential for undiscovered archaeological remains representing every prehistoric period throughout the state. Evidence of human occupation have been discovered in each of New York State Park Regions. During early archaeological research, there was often no clear distinction between prehistoric periods in the archaeological record, due to overlaps between phases of cultural development (Ritchie, 1969). Due to advancements in radiocarbon dating techniques, dates of each period in the archaeological record have been increasingly more accurate, and there is no longer such a significant overlap in the timeline of human occupation in North America (Pauketat, 2012). Radiocarbon dating techniques and associating artifacts discovered with similar ones previously assigned to a particular range of the archaeological record continue to become increasingly accurate (Pauketat, 2012; Haynes, Donahue, Jull, & Zabel, 1984; Haynes, Johnson, & Stafford, 1999).

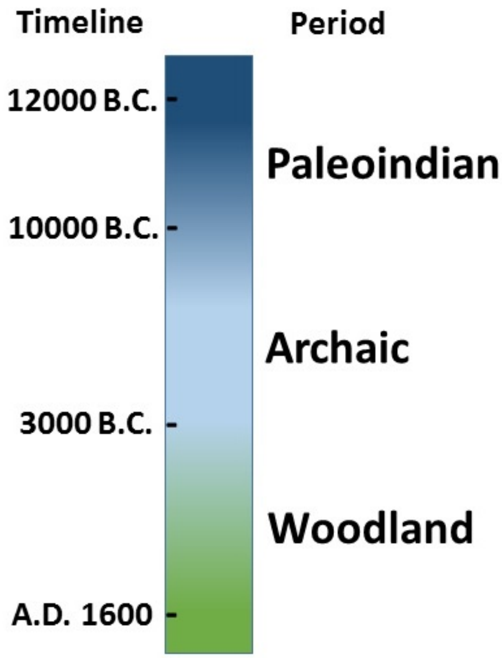

Figure 11.1.11-2: Timeline of Prehistoric Human Occupation

Sources: (Institute of Maritime History, 2015; Pauketat, 2012)

Paleoindian Period (12,000 – 10,000 B.C.)

The Paleoindian Period represents the earliest known human habitation of the northeast United States. The earliest people to occupy the state were small groups of nomadic hunters and gatherers that used chipped-stone tools, including the "fluted javelin head" arrow and spear points, also referred to as the Clovis fluted point. Early hypotheses in American archaeology suggested that the Clovis fluted point was not invented until prehistoric people reached North America and began hunting the large game of that period (Ritchie, 1969). However, studies that are more recent have demonstrated that such technology was prevalent in northeastern Asia, the Arabian Peninsula, and Spain prior to human arrival into North America (Charpentier & Inizan, 2002). Most of the oldest known evidence of human settlement in New York is based on the discovery of fluted points found in surface and shallow deposits throughout the state. Archaeologists hypothesize that the people of this period ranged across the state in small bands that followed migratory game. Early Paleoindian settlers used the Clovis fluted point technology to hunt large game such as mastodon, caribou, stag-moose, giant beaver, and California condor, to name a few species (Laub, 2000). These bands established seasonal camps, some of which likely became permanent settlements. No skeletal remains of these people have been identified to date in New York. It is assumed that they were related to people who migrated to North America via a land bridge at the Bering Strait during the latter part of the last ice age (Late Pleistocene epoch) (Ritchie, 1969; Laub, 2000; Robinson, 2011).

Archaic Period (11,000 – 3,000 B.C.)

During the Archaic Period, American Indian peoples lived in small family based units throughout present day New York. As the climate warmed, ice sheets retreated into modern day Canada, flora and fauna presently found in New York began to be established, and the environment became increasingly more habitable for human groups and community formation. Like the Paleoindians that preceded them, Archaic Period people were hunter-gathers whose diet consisted of wild plants and animals. They gathered wild vegetable foods, hunted for game, and developed efficient fishing practices. Archaic Period inhabitants began building basic shelters (primitive houses) and developed more specialized stone weapons and stone tools. The discovery of shell ornaments, such as "triangular pendants" were being produced during the Archaic Period (Cowin, 2000). However, the culture lacked pottery, the smoking pipe, and technology that is typically associated with agricultural practices (Bolton, 1971; Ritchie, 1969; Levine, 2004).

As presented in the sections below, the Archaic Period is subdivided into the stages of cultural development — Early, Middle, and Late — largely defined by the warming climate, expanding food resources, increasing populations, and the development of sociocultural traditions from contact with other groups through travel or trade (Ritchie, 1969; Levine, 2004).

In the Early Archaic Stage, trees that thrived in cold climates, such as spruce, and deciduous trees, such as oak, chestnut, and maple, were gradually replacing existing pine and hemlock forests. The semi-nomadic people of this stage began to populate the New York area, including Long Island. The archaeological record indicates that the people had not developed very sophisticated means for storing food. Summer months were probably bountiful and groups up to 75 people lived together. As food became scarce in the winter, and with little means for storing items of subsistence, the large groups split into small bands that were better able to forage for scarce food resources. Archeological evidence of the Early Archaic Stage people in the New York area consists primarily of the locations of occupation sites that once contained large campfires characterized by features containing organic remains and fire-cracked rocks, which support the hypothesis that the people were adept at hunting and large-scale cooking techniques (New York Institute of Anthropology, 1997). From 1997 to 2000, the Cayuga Lake Archaeology Project revealed occupation of Early Archaic people through New York's Finger Lake District. A dozen or so previously undiscovered archaeological sites were located there and revealed artifacts from the Early Archaic to the Late Woodlands periods. Prior to these discoveries, it was hypothesized that the landscapes in the drainage areas of the Finger Lake's district did not support the diversity of the sites that the Cayuga Lake Archaeology Project revealed (Levine, 2003).

By the Middle Archaic Stage, the climate in New York had moderated enough to support a forest environment with conditions similar to those that exist today. The region had an abundance of food sources, including wild game, fowl, nuts, berries, tubers, roots, and herbs, which supported growing populations of semi-nomadic peoples (Bolton, 1971; New York State Museum and Science Memoir 20, 1973). Tools such as the atlatl javelin[161] have been recovered throughout the state, suggesting that Middle Archaic Stage people were developing more sophisticated hunting practices (Bolton, 1971; Ritchie, 1969).

Many of the coastal archaeological sites associated with the Middle Archaic and earlier periods are now underwater. Melting glaciers of the last Ice Age steadily raised sea levels and permanently inundated previously inhabited coastal lands (Bolton, 1971; New York Archaeological Council, 2015).

Archaeological sites of the Late Archaic Stage are well documented throughout New York. Hardwood forests dominated the region and the subsistence base included white tail deer, black bear, small game animals, and aquatic and wild vegetable food sources. The warmer climate, and abundance and variety of food sources, gave rise to population increases by new migration of groups from outside the region or increases of indigenous populations (Ritchie, 1969; Levine, 2004).

Both stone and bone tools have been documented in the archaeological record of this stage of human occupation development in New York. Groundstone implements were used for woodworking, and for grinding and milling vegetable foods. Small-stemmed and side-notched projectile points (arrowheads), and bone tools such as fishhooks and daggers have been identified and dated to the Late Archaic Stage of human development in this region. Habitation sites range from small, scattered campsites to sites more than three acres with deep refuse of deposits. The Lamoka Lake site near Tyrone, NY, is an example of a large, long-term Late Archaic Stage site that was likely occupied year-round (Ritchie, 1969; Levine, 2004).

The Terminal Archaic Period is a transitional stage from the Archaic to the Woodland. Much of the same technology from the Late Archaic remains prevalent. However, the archaeological record indicates that there was an increase for exploitation of coastal environments (Lavin, 1988). A large number of archaeological sites that show up around marshes and coastal/riverine environments. Shell fishing became a major subsistence occupation during this time and continued throughout the Woodland Period (Lightfoot & Cerrato, 1988; Lavin, 1988).

Woodland Period (3,000 B.C. – A.D. 1600)

Similar to the Archaic Period, the Woodland Period is divided into three sequential stages: Early, Middle, and Late. The three stages are defined by phases of cultural development, based on archaeological evidence at temporal (place in time) locations. During the course of the Woodland Period, there is a gradual shift from a semi-nomadic to a more sedentary lifestyle

[161] The atlatl javelin was a spear-throwing device with a stone weight. The weight was placed on a narrow board, which works like a lever, and the device projected out behind the throwing hand, permitting the javelin resting into its end to be hurled with greater force and precision. (Bolton, 1971; Ritchie, 1969)

based on horticulture or crop-growing practices (Bolton, 1971; Ritchie, 1969; Hart, Thompson, & Brumbach, 2003; Cantwell & diZerega Wall, 2001).

Hunting and fishing was the predominant form of subsistence during the Early Woodland Stage. A wider variety of materials was used in manufacturing tools than those used during the earlier Archaic Period, such as non-local stone, bone, ground stone, and some copper tools. Artifacts of Early Woodland peoples in New York include ceremonial objects and gorgets (an object made of various materials that protected the base of the throat, and was often ornamental in appearance), birdstones (abstract stone carving), smoking pipes, and copper ornaments. Features of this stage include "elaborately furnished cremation burials, large sites containing storage pits, and the first occurrence of burial mounds" in New York (Ritchie, 1969; New York State Museum and Science Memoir 20, 1973). However, the main technology that differentiates the Woodland Period from the Archaic Period is the development and use of pottery, which originated in the Southeastern United States during the late Archaic Period and spread northward to New York and elsewhere (Sassaman, 1998).

The Middle Woodland Stage is distinguished by more ornate and varying types of pottery identified as stamped or impressed pottery – dentate, pseudo-scallop-shell, rocker-stamped (dentate and plain varieties) and cord-ornamented pottery – as well as numerous stone and bone tools. Some of these artifacts originated in the Upper Great Lakes region, and are evidence of migration and trade with people from other regions of North America. Other artifacts of the Middle Woodland Stage, such as the elbow pipe and the platform pipe, were regional influences of the Hopewellian mound-building complex and associated with the practice of mortuary ceremonialism, particularly in western New York (Ritchie, 1969).

Rudimentary horticulture began to make a significant contribution to the diet of Middle Woodland Stage populations, as did shellfishing among coastal populations. The people of this stage also exhibited a wide range of burial practices, used exotic materials as grave goods, and left other cultural artifacts associated with increasingly sedentary patterns of existence (Ritchie, 1969; New York State Museum and Science Memoir 20, 1973).

By the Late Woodland Stage, the archaeological record indicates a change of diet that resulted from a permanent shift to sedentary lifestyles for people in present day New York. Large villages of communal longhouses were built, often protected by palisades (Kerber, 2012). Pottery of traditional classic Woodland lineage underwent progressive modifications, as did pipe styles derived from the straight and elbow forms (Veit & Bello, 2001). There was an "increased dependence on horticulture, especially as it relates to the introduction of corn, maize, beans, and squash" (Kerber, 2012). Coincident with these cultural changes, the practice of mortuary ceremonialism tapered to extinction during this stage (Kerber, 2012; Ritchie, 1969).

A regionally noteworthy element of the Late Woodland Stage was development of Owasco culture in central New York. Characterized by a lifestyle of mixed agricultural practices, the Owasco culture is considered the precursor of the historically known Iroquois culture (Kerber, 2012). "It was the combination of maize with beans and squash and the intensity of agriculture production, which set the Late Woodland economy apart from that of the Middle Woodland, not the presence of maize" (Hart, Thompson, & Brumbach, 2003).

11.1.11.4 Federally Recognized Tribes of New York

According to the Bureau of Indian Affairs and the National Conference of State Legislators, there are eight federally recognized tribes in New York: the Cayuga Nation, the Oneida Nation of New York, the Onondaga Nation, the Saint Regis Mohawk Tribe, the Seneca Nation of New York, the Shinnecock Indian Nation, the Tonawanda Band of Seneca, and the Tuscarora Nation (National Conference of State Legislatures, 2015) (GPO, 2015). The location of federally recognized tribes are highlighted in bold in Figure 11.1.11-3. The other tribes depicted on the figure are general locations of tribes that were known to exist in this region of the United States, but are not officially federally recognized.

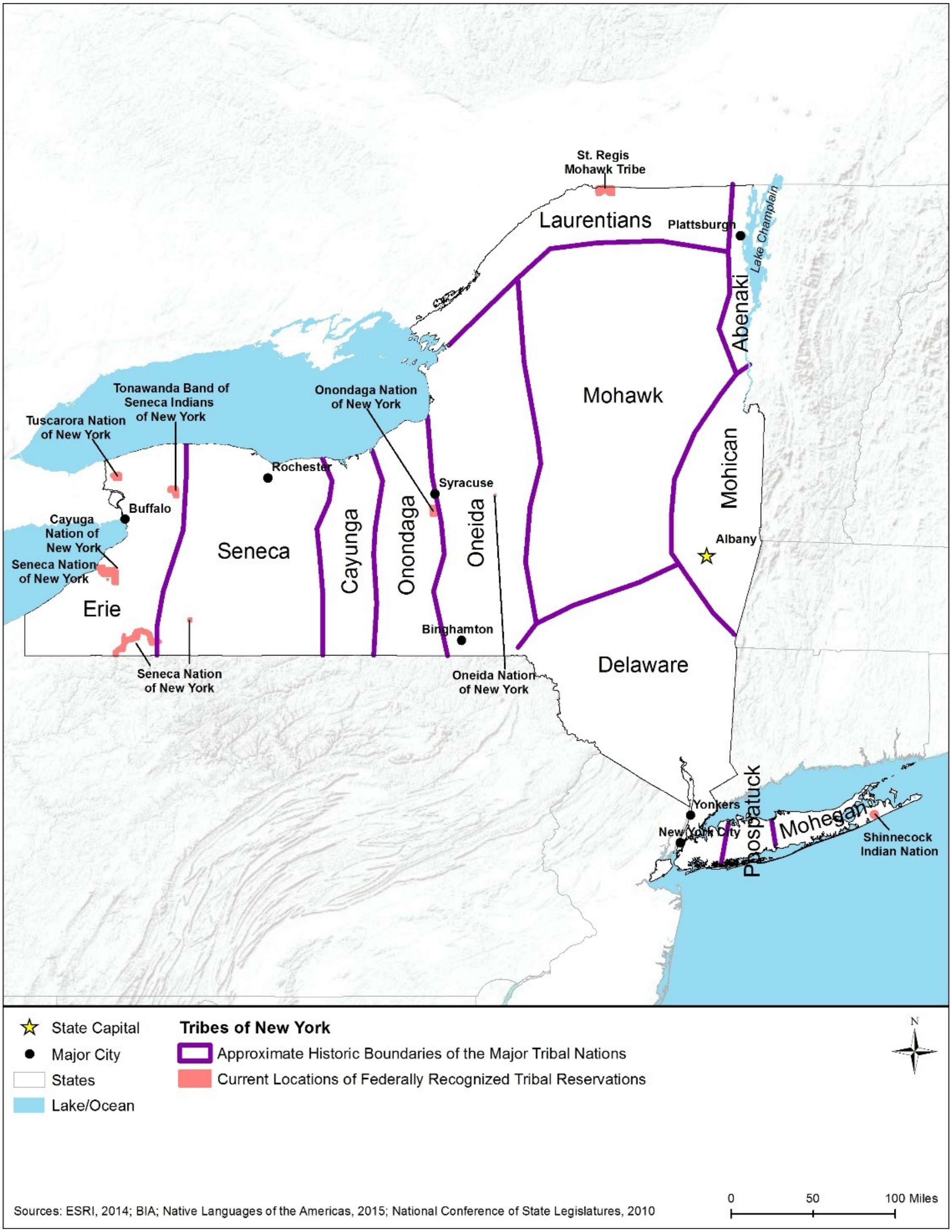

Figure 11.1.11-3: Federally Recognized Tribes in New York

11.1.11.5 Significant Archaeological Sites of New York

As previously mentioned in Section 11.1.11.3 there are 78 archaeological sites in New York listed on the NRHP. Table 11.1.11-2 lists the names of the sites, the city they are closest to, and type of site. The list includes both prehistoric and historic archaeological sites. The number of archaeological sites may increase with the discovery of new sites. A current list of NRHP sites can be found on the NPS NRHP website at http://www.nps.gov/nr/ (NPS, 2014e).

New York State Cultural Resources Database and Tools

New York Cultural Resources Information System (CRIS)

CRIS is an advanced Geographic Information System (GIS) that allows access to New York State's many cultural resources databases. The system was developed by the New York State Parks, Recreation and Preservation Office as a tool to evaluate potential impacts to cultural resources for project specific areas of potential effects (APE),[a] and to support the preservation of known and potentially undiscovered historical and/or archaeological sites. It includes more than 1.5 million pages of digitized images from *National Register* documents, building and archaeological inventory forms, survey reports, and other various legacy data. Users may access CRIS at (https://cris.parks.ny.gov/Login.aspx?ReturnUrl=%2f). (New York Office of Parks, Recreation, and Historic Preservation, 2015z)

New York Archaeological Council (NYAC)

The New York Archaeological Council (NYAC) has various resources and materials that can be accessed through its website (http://nysarchaeology.org/). The website makes available a wide variety of materials for those concerned about potential impacts to archaeological resources across the state. There are links to the NRHP, sources for obtaining preservation assistance, general information on the archaeology of New York, the environmental review process, and resources for technical assistance. A list of practicing New York archaeologists is also provided. (New York Archaeological Council, 2015)

New York State Archaeological Association (NYSAA)

The New York State Archaeological Association (NYSAA) is another source of information and is a formation of avocational and professional archaeologists associated with New York. There are 16 regional chapters of the NYSAA with the goals of promoting the study of New York archaeology and encourage the cataloging and preservation of archaeological collections, preserving and protecting archaeological sites within the state, and creating a public appreciation of the state's archaeological resources (New York State Archaeological Association, 2015). Each chapter represents the area as depicted in the State Park Region map (Figure 11.14.3-1).

[a] An APE "is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character of use of historic properties, if any such properties exist" (36 CFR 800.4(a)(1) (GPO, 2015).

Table 11.1.11-2: Archaeological Sites on the National Register of Historic Places in New York

Closest City	Site Name	Type of Site
Adams	Talcott Falls Site	Historic
Albany	Onesquethaw Valley Historic District	Historic District
Alcove	Valley Paper Mill Chimney and Site	Historic
Annandale-on-Hudson	Montgomery Place	Historic
Athens	West Athens Hills Site	Prehistoric
Baltimore	Croswell-Parsons Paper Mill Ruin	Historic
Bolton	Cadet	Shipwreck
Canajoharie	Rice's Woods	Historic Native American
Cape Vincent	Fort Haldimand Site	Historic
Castleton-on-Hudson	Joachim Staats House and Gerrit Staats Ruin	Historic District
Champlain	USS Spitfire	Revolutionary Gunboat
Cicero	Robinson Site	Prehistoric
Clayton	Swarthout Site	Historic
Cold Spring	West Point Foundry Archeological Site	Historic
Coxsackie	Flint Mine Hill Archeological District	Prehistoric
Cutchogue	Fort Corchaug Archeological Site	17th century Native American
Danube	Mohawk Upper Castle Historic District	Historic
Dunkirk	Dunkirk Schooner Site	Shipwreck
Earlton	Forestville Commonwealth	Historic
Elbridge	Elbridge Hydraulic Industry Archeological District	Historic
Ephratah	Garoga Site	Prehistoric
Ephratah	Klock Site	Prehistoric
Ephratah	Smith Pagerie Site	Prehistoric
Fire Island	USS California	Shipwreck
Fishkill	Van Wyck Homestead	Historic
Fonda	Caughnawaga Indian Village Site	Prehistoric
Fort Plain	Fort Plain Conservation Area	Historic
Fort Salonga	Fort Salonga	Historic
Fulton	Shafer Site	Historic
Geneseo	Wadsworth Fort Site	Historic Iroquois (Burial)
Greenwich	Coffin Site	Prehistoric
Grove	Claud No. 1 Archeological Site	Prehistoric
Guilderland	Albany Glassworks Site	Historic
Hamburg	Kleis Site	17th century Iroquoian Village
Hounsfield	Storrs' Harbor Naval Shipyard Site	Historic
Ithaca	Ithaca Pottery Site	Prehistoric
Lake George	Forward shipwreck site	Shipwreck
Lake George	Land Tortoise	Shipwreck
Lake George	Wiawaka bateaux	Multiple Shipwrecks

Closest City	Site Name	Type of Site
LeRay	LeRaysville Archaeological District	Historic (Manufacturing)
Lewiston	Lewiston Mound	Burial Mound
Lewiston	Lower Landing Archeological District	Archaeological District
Lewiston	Lower Niagara River Spear Fishing Docks Historic District	Historic
Massena	Robinson Bay Archeological District	Historic District
Montauk	HMS Culloden	Shipwreck
Moreau	Royal Blockhouse, The	Historic
Morganville	Morganville Pottery Factory Site	Historic
Nelliston	Ehle House Site	Historic
New Forge	House of New Forge	Historic
New York	Fort Washington Site	Historic
New York	Wards Point Archeological Site	Historic and Prehistoric
New York	Ward's Point Conservation Area	Historic and Prehistoric
Newburgh	Newburgh Colored Burial Ground	Historical Burial Ground
Ognesburg	Fort de La Présentation	Historic
Oneonta	Fortin Site	Prehistoric
Otego	Otsdawa Creek Site	Prehistoric
Oyster Bay	Fort Massapeag Archeological Site	Historic (Indian Fort)
Philadelphia	Sterlingville Archeological District	Historic
Plattsburg	Fort Brown Site	Historic
Plattsburg	Pike’s Cantonment Site	Historic
Pultneyville	St. Peter, (Shipwreck)	Shipwreck
Rhinecliff	Kip-Beekman-Heermance Site	Historic
Saratoga Springs	Arrowhead Casino Prehistoric Site	Prehistoric
Stone Arabia	Kilts Farmstead	Historic
Stuyvesant	Stuyvesant Falls Mill District	Historic District
Tahawus	Adirondack Iron and Steel Company	Historic
Town of Goshen	Duchess Quarry Cave Site	Prehistoric
Troy	Burden Iron Works Site	Historic
Troy	Poesten Kill George Historic District	Historic District
Trumansburg	Indian Fort Road Site	Prehistoric
Unadilla	Russ-Johnsen Site	Historic
Victor	Boughton Hill	Historic (Native American)
West Port	Champlain II Shipwreck	Shipwreck
West Seneca	Eaton Site	Prehistoric
West Sparta	R. P. Kemp No. 1 Site	Prehistoric
Westport	Vergennes (canal boat) Shipwreck Site	Shipwreck
Wilna	Wood's Grist Mill	Historic

Source: (NPS, 2015p)

11.1.11.6 Historic Context

The area that comprises the state of New York was settled by the Dutch in the 1600s, with early settlement occurring primarily on Manhattan (then known as New Amsterdam) and in the Hudson River Valley. The Dutch West India Company controlled New York until the 1640s as a proprietary colony with the purpose of capitalizing on the North American fur trade. At the time of European contact, the Hudson River Valley was occupied by the Haudenosaunee, or Iroquois, people, who were a confederation of well-organized tribes that established relations with the European settlers based on their knowledge and control of the area (New York Division of Historic Preservation, 2015).

The early period of settlement in the Hudson River Valley was marked by conflict between the Dutch and the British over control of the region. In 1664, the British ousted the Dutch; however, hostilities in the area did not end at that time. The British were also involved in territorial battles with both the French and Indians. The Iroquois sided with the French during the French and Indian War; however, England was triumphant and maintained control of the area until the conclusion of the American Revolution. New York played a major role in the American Revolution due to its prominence with respect to trade and commerce. In 1785, New York City became (until 1790) the temporary capital of the republic. Conflict erupted again with the War of 1812, and heavy fighting occurred in many places in the state and throughout the region (New York Division of Historic Preservation, 2015).

The 19th century was marked by economic growth across the state, much of it related to the construction of the Erie Canal system. The canal allowed for the development of inland areas and supported manufacturing and trade (Erie Canalway National Heritage Corridor, 2006). Similarly, development of New York City was spurred by the construction of the Croton Aqueduct (built from 1837 to 1848), which brought potable water into the city. The Erie Canal and elements of the Croton Aqueduct still exist today (New York Division of Historic Preservation, 2015).

New York experienced a manufacturing boom during World War II (WWII); however, many cities have since experienced hardships associated with the loss of heavy industry (New York Division of Historic Preservation, 2015). The conditions of existing historic resources in these cities is reflective of their boom-bust history, and more recent long-term decline.

New York has 5,703 NRHP listed sites, as well as 271 National Historic Landmarks (NHLs) (NPS, 2014d). New York also contains four National Heritage Areas (NHA) (NPS, 2015o). Additionally, the state recognizes 20 State Heritage Areas, which are broken into urban and regional heritage areas (New York Office of Parks, Recreation, and Historic Preservation, 2015x). Figure 11.1.11-4 shows the location of NHAs and NRHP sites within the state, while Figure 11.1.11-5 shows the locations of State Heritage Area.[162]

[162] See Section 11.1.7 for a more in-depth discussion of additional cultural resources as they relate to land use and recreational resources.

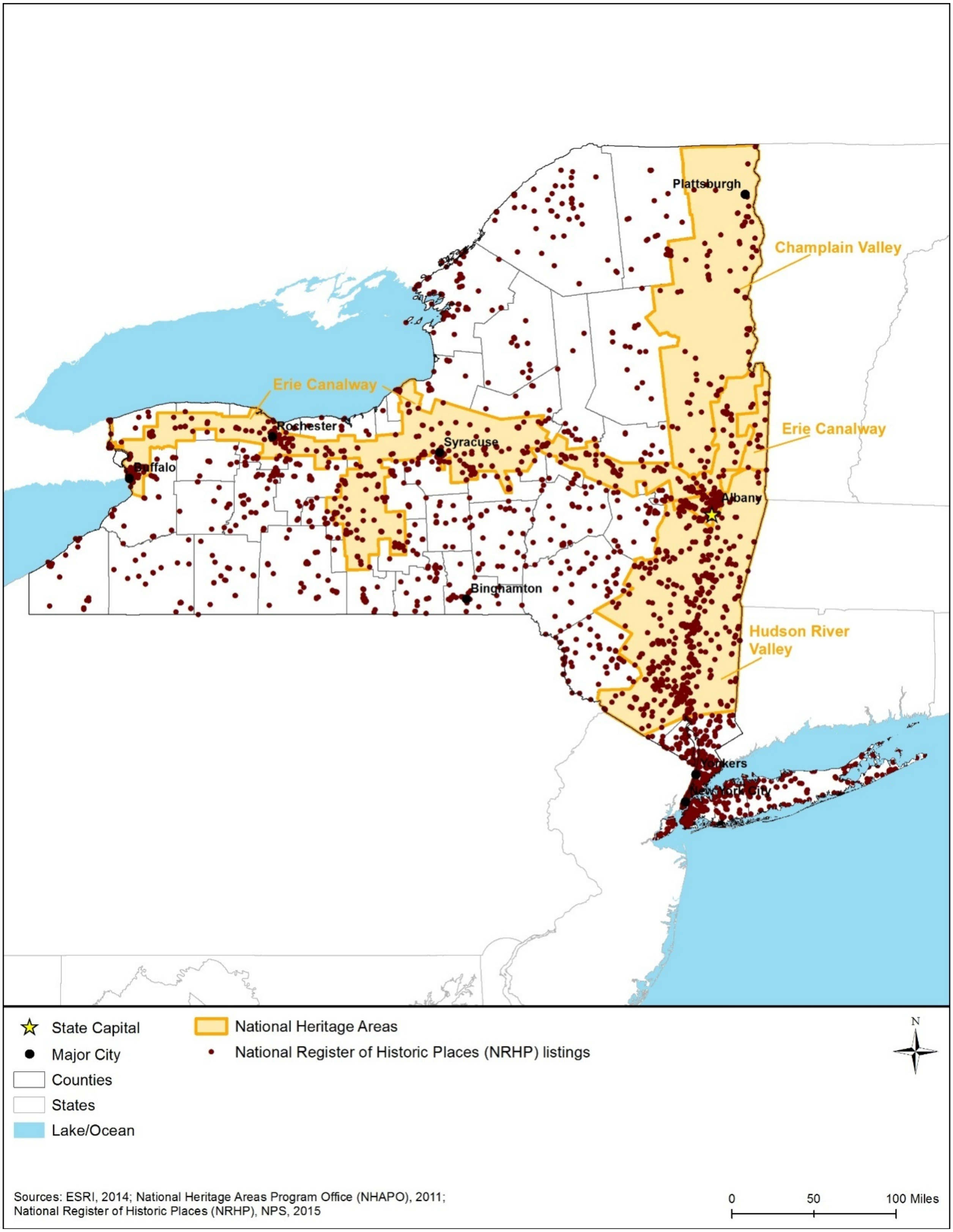

Figure 11.1.11-4: National Heritage Areas (NHA) and NRHP Sites in New York

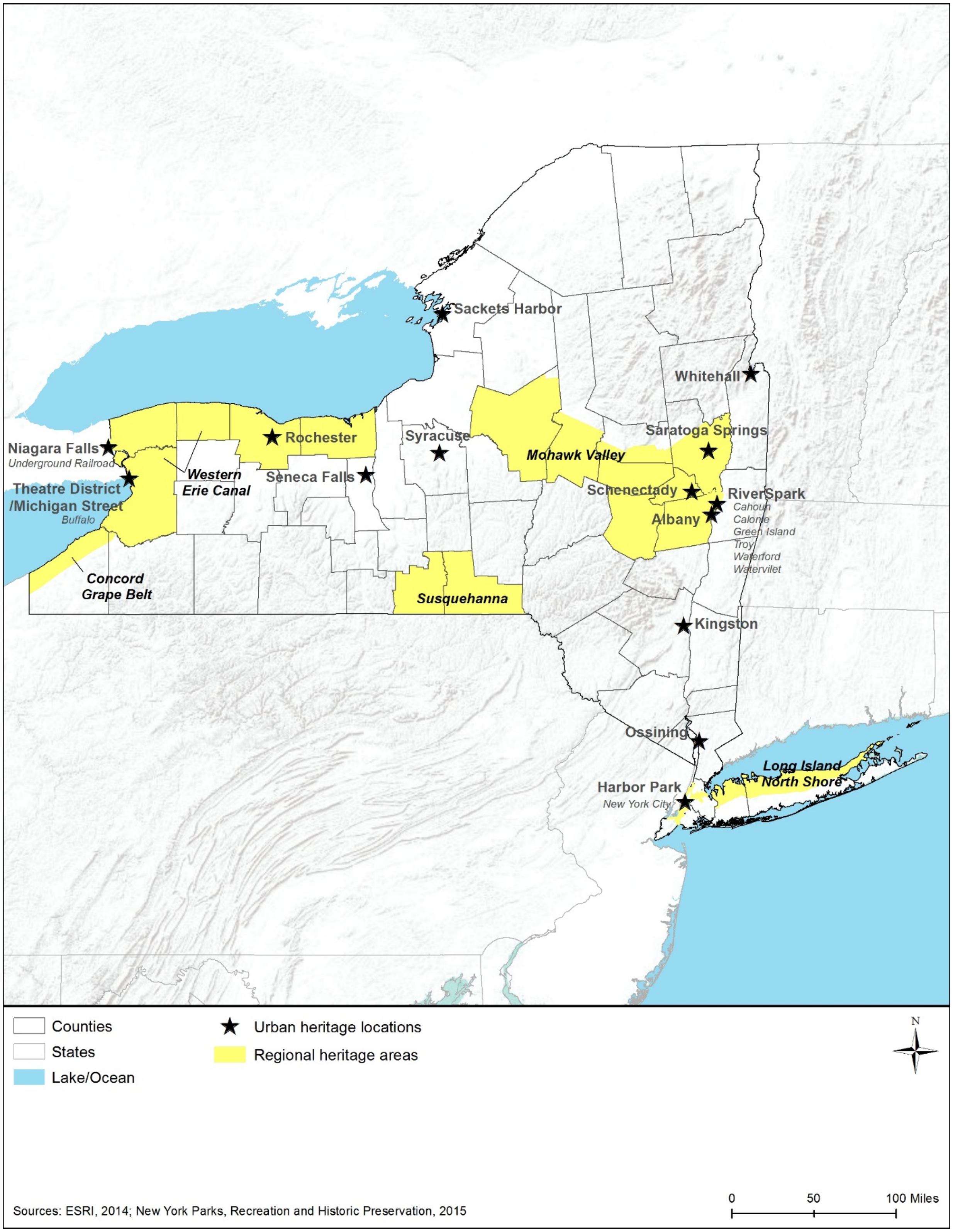

Figure 11.1.11-5: State Heritage Areas in New York

11.1.11.7 Architectural Context

Cultural resources within New York vary greatly based on the history of the area in which they are located, making it most effective to examine resources based on these different state areas. While large areas of the state were agricultural, New York developed as a trading and manufacturing hub. The Hudson and Mohawk Rivers, and later the extensive canal system, served as transportation veins spreading goods and cultural trends throughout the state. Early architecture exhibits a heavy Dutch influence, with English trends becoming more pronounced beginning in the late 17th century. Following the American Revolution, domestic styles began to develop and spread throughout the country. The picturesque Gothic Revival and East Lake movements of the Victorian Era, along with the Adirondack Great Camps, are examples of styles that New York helped define for the rest of the country (Eisenstadt & Moss, 2005). Figure 11.1.11-6 depicts the regions that are described in the subsections that follow. As is always the case with the sharing of cultural practices, boundaries are fluid, and those shown in Figure 11.1.11-6 are only approximations of past and current architectural regions. Figure 11.1.11-7 shows representative architectural styles in New York.

Adirondacks and North Country

The waterways throughout this region were of crucial importance to early territorial conflicts, so fortifications (often star-shaped) were built in strategically important areas (Eisenstadt & Moss, 2005). Fort Ticonderoga is one example that still exists today. Non-military architecture from the early Colonial Period was similar to the timber-framed structures throughout New England and Quebec, usually exhibiting French, English, or Dutch influence. French influence was common in the North Country, as there was an exchange of both people and ideas from Quebec. Early building materials included more stone than wood, with limestone, sandstone, and granite being popular. Log construction was common, including half-timber structures that, along with the picturesque movement, inspired the Adirondack Great Camps that would be built in this region during the late 19th and early 20th centuries (Eisenstadt & Moss, 2005).

Adirondack Great Camps were large, rustic, picturesque cabins that served as wilderness retreats for wealthy families beginning in the latter part of the 19th century. The camps were set on large tracts of land and were built up until just before WWII; many are now in state forest preserves, and some are protected as NHLs (National Register of Historic Places, 1986). The region also includes a collection of impressive civic and institutional buildings, such as churches and sanitariums, often built in Gothic Revival or Victorian Era styles (Eisenstadt & Moss, 2005).

Albany and Capital District

Albany's early structures included many brick building in a Dutch style, with stepped gable-ends facing the street (Eisenstadt & Moss, 2005). After the English gained control of New York, buildings began to look more Georgian, with examples of these structures still populating the region today. Downtown Albany contains civic and commercial buildings ranging in style from Richardsonian Romanesque, to Neoclassical, to Art Deco. Perhaps Albany's most notable architectural landmark is the Empire State Plaza, a modern office complex of the International Style next to the capitol building, built during the 1960s and 1970s (Eisenstadt & Moss, 2005).

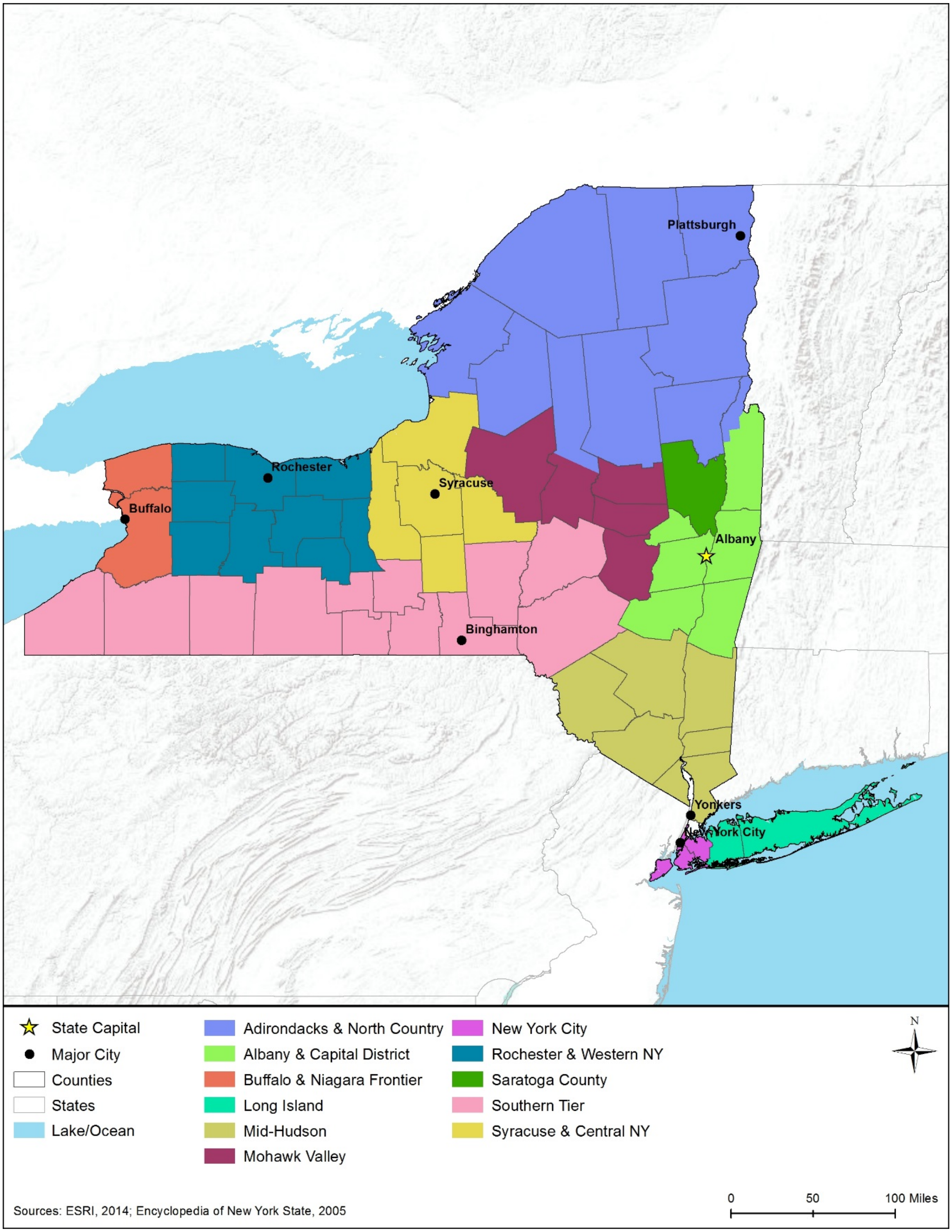

Figure 11.1.11-6: Architectural Regions of Analysis for New York

The neighboring city of Troy includes high style houses from the 19th century built for wealthy residents, as well as a collection of row houses similar to New York City with respect to their style and architectural distinction. Commercial and industrial buildings dating to the late 19th and early 20th centuries are found throughout Troy as well (Eisenstadt & Moss, 2005).

Buffalo and the Niagara Frontier

Old Fort Niagara (1726), a stone chateau on Lake Ontario, is an example of early 18th century French architecture in the region (Old Fort Niagara, 2015). The city of Buffalo was platted in 1804 and features a city plan that was influenced by that of Washington, D.C. (National Register of Historic Places, 2005). Buffalo grew dramatically during the mid-19th century following the opening of the Erie Canal, and there are several structures built in Gothic Revival and Victorian Era styles from the mid-19th through the early 20th centuries. The Arts and Crafts movement was popular as well, with many Buffalo suburbs exhibit this and later styles (Eisenstadt & Moss, 2005). Buffalo contains a large collection of Frederick Law Olmstead-designed landscapes, with Delaware Park being the prime example (National Register of Historic Places, 1979a). The city also contains a collection of works by Frank Lloyd Wright, Louis Sullivan, and H.H. Richardson.

Modernism gained popularity in this region during the 20th century, as did Neoclassicism following the 1893 Columbian Exposition in Chicago. City Hall is an example of Art Deco architecture, as is New York Central Terminal. As a major shipping port, Buffalo possesses a collection of historic grain elevators. Beginning in the late 19th and early 20th centuries, the wooden grain elevators were replaced with the concrete versions that remain today (Eisenstadt & Moss, 2005). One of the most notable grain elevators, the Great Northern Grain Elevator, was completed in 1897 and still exists today (Buffalo Architecture and History, 2002).

Long Island

Europeans first settled Long Island in the 17th century and the area retains many buildings that exhibit a Dutch influence. These structures are notable for their massive central chimneys, wood siding, and small casement windows, which are typical of Post-Medieval architecture (Eisenstadt & Moss, 2005). Long Island also retains many 18th century Georgian structures, and a collection of historic windmills, tide mills, and lighthouses that are indicative of its agricultural and maritime history (National Register of Historic Places, 1978).

Around the turn of the 20th century, Long Island became a desirable residential area. This trend was fostered by improvements in train transportation, but especially by the automobile. The views of Robert Moses, who favored automobile transportation over public transportation, were instrumental in the development of Long Island (Eisenstadt & Moss, 2005). High-style residences were built, that included the Chateau style, Art Nouveau, and English country homes. In the 1920s and 1930s, Modernism was introduced, and houses of this style were constructed well into the mid-20th century. Following WWII, automobile-centric suburb development dominated Long Island, with Levittown being a significant example (Eisenstadt & Moss, 2005).

Mid-Hudson

The architecture in the area between New York City and Albany spans nearly four centuries. In the 17th century, Dutch settlers lived in heavy timber-framed Dutch post-medieval houses. The gambrel roof was introduced from New England in the 1760s, as were other Georgian elements that had been slow to take hold. The Federal style was not widely adopted in the rural Mid-Hudson until the early 19th century. Grand houses were sited along the river, resulting in the collection of estates that now comprises the Hudson River NHL District. Greek Revival was common, as was Gothic Revival, made popular by Hudson Valley architect Andrew Jackson Davis. Other Victorian styles remain present throughout the region (Eisenstadt & Moss, 2005).

Institutional buildings are common, such as the Hudson River State Hospital, as are academic buildings dating to the early 19th century; Bard and Vassar Colleges are two examples. Mill buildings and ironwork complexes are common throughout the Hudson River Valley. In the late 19th and early 20th centuries, rail travel expanded settlement outward from the river into the countryside and suburban housing became popular in the post-WWII era (Eisenstadt & Moss, 2005). Historic lighthouses are common as well (National Register of Historic Places, 1979b).

Mohawk Valley

The Mohawk Valley has an architectural history dating back to the prehistoric era, as the Mohawk Indians were famous for their longhouses (Eisenstadt & Moss, 2005). European settlement began in the second half of the 17th century with the settlement of what is now Schenectady. Existing structures range from Dutch style buildings from the 1690s, to Victorian Era and Craftsman architecture from the late 19th and early 20th centuries. The Stockade Historic District in downtown Schenectady contains over 40 structures that are at least 200 years old. Greek Revival was popular throughout the Mohawk Valley in both residential and institutional construction, with mental health facilities being a common institutional building. The New World Dutch Barn is an important agricultural building that employed a combination of Dutch and Palatine German architecture (Eisenstadt & Moss, 2005).

Several resorts associated with mineral water springs were built in the Mohawk Valley in the 19th century. While these resorts no longer exist, the growth associated with them is still visible. Thomas Edison's General Electric was founded in Schenectady in the late 19th century and influenced local development through the construction of both worker housing and a large plant. Modernist architecture dating to the 20th century is present as well (Eisenstadt & Moss, 2005).

New York City

New York City has always featured a variety of architectural styles. During the First Period (pre-1730) and later colonial era, structures in New York replicated European forms. While there are no remaining Dutch buildings in Manhattan, they do exist in Brooklyn, Queens, and Staten Island. These often had gabled-roofs with a kick, resembling those of the Hudson River

Valley.[163] From 1664 to 1783, architecture in New York City was influenced by English trends; however, few of these structures remain (Eisenstadt & Moss, 2005).

The challenge of affordable housing has faced New York City for some time. In the 19th century, workers lived in close quarters near their places of employment. Rowhouses dominated the landscape, ranging from vernacular brick structures to elaborate mansions. Richardsonian Romanesque brownstones are an example of high style rowhouses from the late 19th century (New York Landmarks Commission, Row House Manual). Large country homes were popular for the elite and were generally located in the northern portion of Manhattan (Eisenstadt & Moss, 2005). While most of these are now gone, there are a few surviving examples such as Alexander Hamilton's former home, Hamilton Grange (originally The Grange), near Harlem, which is managed as an historic site by the National Park Service (NPS, 2015q).

Tenement housing, and ultimately modern apartments, replaced rowhouses in the late 19th and early 20th centuries. Early examples were four to five stories tall, with buildings reaching twelve to thirteen stories by the 1930s. The style of these structures changed to reflect popular architectural styles of the time (Eisenstadt & Moss, 2005). New York is perhaps most famous for its skyscrapers, which began to appear in the late 19th century. Increasing land prices and decreasing availability necessitated verticality, while new building materials allowed buildings to become taller. A race between architects ensued, with each trying to design the tallest structure. The Empire State Building held this title the longest (nearly 40 years), before being surpassed by the World Trade Center towers in the early 1970s (Eisenstadt & Moss, 2005).

Rochester and Western New York

Rochester's architectural history is dominated by commercial structures dating from the second quarter of the 19th century. The city features architectural styles ranging from late Federal, to Greek Revival, to Victorian. Rochester also retains several early skyscrapers that exhibit Romanesque and Neoclassical styles. Institutional and civic buildings of a variety of late 19th and early 20th century styles are present, including schools, universities, and courthouses. Mid-to-late 20th century office buildings of the Modern and International styles dominate the downtown skyline in the present day (Eisenstadt & Moss, 2005).

Residential areas around Rochester include structures that exhibit a full complement of styles spanning the area's entire developmental history. There is a large collection of Greek Revival homes that were popular during the initial economic boom of the Erie Canal. Later in the 19th century, residential areas expanded into the surrounding farmlands in order to accommodate growth associated with the canal system. These neighborhoods have many intact Victorian Era homes, which were popular throughout the state as a whole (Eisenstadt & Moss, 2005).

Saratoga County

Prior to the late 18th century, few non-military structures were built north of Albany, and as a result, most of the earliest structures in this area date to the Federal period. The most well

[163] A "kick" is a sweeping curve towards the outer edge of the roof.

known area in the region, Saratoga Springs, developed as a vacation and resort destination in the 1830s. The architecture of the area came to be defined by the grand hotels that were constructed throughout the 19th century. These structures ranged in style from Greek Revival to Second Empire; however, most were demolished in the early-to-mid 20th century. Large spa and bathhouses became popular around the same time and many were built in the Beaux Arts style. Residential houses constructed in High Victorian styles were common during the 19th century, and many still exist today (Eisenstadt & Moss, 2005).

Southern Tier

Binghamton was settled in 1802, and its architectural style matured during the second quarter of the 19th century. While Federal style structures from the early 19th century were vernacular, the Greek Revival structures that followed were on par with others throughout the country. Several mid-19th century Gothic Revival churches and institutional buildings still exists today, as does a Carnegie Library dating to 1899. A large Civic Center complex and City Hall were constructed following WWII (Eisenstadt & Moss, 2005).

Ithaca is well known for Cornell University (1865), whose campus includes a variety of building styles. Many of the early buildings associated with Cornell featured mansard roofs and other Victorian Era elements. Greek Revival houses were common early on, but were soon surpassed in popularity by Gothic Revival and later Victorian Era styles (Eisenstadt & Moss, 2005).

Existing historic architecture in the western portion of the Southern Tier includes both vernacular and high style housing, as well as commercial and industrial buildings. Styles include Federal style architecture early on, Greek Revival architecture (influenced by New Englanders), and Victorian structures dating to the second half of the 19th century. Many homes were built using architectural plan books. Colonial Revival homes appeared in the early 20th century, while Modernism took over around the middle of the 20th century. Planned communities were common, with Point Chautauqua serving as an example of a planned community that was laid out by Frederick Law Olmstead (Eisenstadt & Moss, 2005).

Syracuse and Central New York

Following the American Revolution, the settlement and development of the Syracuse area increased greatly as settlers from New England moved to this part of New York. In the 19th century, Federal and Classical Revival styles were practiced widely, including Greek Revival. These buildings were often designed by architects from around the capital area and many still exist today (Eisenstadt & Moss, 2005). Cobblestone construction was also common during the second quarter of the 19th century using local fieldstones (National Register of Historic Places, 1991). In church architecture, the Gothic Revival style became dominant during the mid-19th century, and many impressive churches remain today (Eisenstadt & Moss, 2005).

A wide range of Victorian Era style houses are present throughout central New York, as are high style buildings dating to the late 19th century. Structures built in the Richardsonian Romanesque style are plentiful, as are Octagon Houses constructed during the second half of the 19th century. While Octagon Houses were built nationwide, they were concentrated heavily in this area of

New York (Eisenstadt & Moss, 2005). During the late 19th and early 20th centuries, the Arts and Crafts movement became popular among architects such a Ward Wellington Ward and Gustav Stickley (National Register of Historic Places, 1997). Commercial architecture from the 20th century was often designed by firms from neighboring cities, such as Albany and New York City, and includes styles ranging from Art Deco to International (Eisenstadt & Moss, 2005).

Figure 11.1.11-7: Representative Architectural Styles of New York

- Left: "Empire State Building view of New York, New York." 1980. Library of Congress Prints and Photographs Online Catalog, http://www.loc.gov/pictures/item/2011631617/
- Center Top: "Wilderstein, Morton Road, Rhinebeck, Dutchess County, NY." Library of Congress Prints and Photographs Online Catalog, http://www.loc.gov/pictures/collection/hh/item/ny0190.photos.116134p/
- Center Middle: "Christian F. Philips House, 120 Saint James Street, Kingston, Ulster County, NY." Library of Congress Prints and Photographs Online Catalog, http://www.loc.gov/pictures/collection/hh/item/ny0827/
- Center Bottom: "Darwin D. Martin House, 125 Jewett Parkway, Buffalo, Erie County, NY" Library of Congress Prints and Photographs Online Catalog, http://www.loc.gov/pictures/item/ny0203.photos.116390p/resource/
- Right: "State Lunatic Asylum, 400 Forest Avenue, Buffalo, Erie County, NY." Library of Congress Prints and Photographs Online Catalog, http://www.loc.gov/pictures/item/ny0207/

11.1.12 Air Quality

11.1.12.1 Definition of the Resource

Air quality in a geographic area is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography[164] of the area, and the prevailing weather and climate conditions. The levels of pollutants and pollutant concentrations in the atmosphere are typically expressed in units of parts per million (ppm)[165] or micrograms per cubic meter ($\mu g/m^3$) determined over various periods of time (averaging time).[166] This section discusses the existing air quality in New York. USEPA designates areas within the United States as attainment,[167] nonattainment,[168] maintenance,[169] or unclassifiable[170] depending on the concentration of air pollution relative to ambient air quality standards. Information is presented regarding national and state ambient air quality standards and nonattainment areas that would be potentially more sensitive to impacts from implementation of the Proposed Action or Alternatives.

11.1.12.2 Specific Regulatory Considerations

National and State Ambient Air Quality Standards

The Clean Air Act (CAA) establishes National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: Carbon monoxide (CO), lead, oxides of nitrogen (NO_X), particulate matter ($PM_{2.5}$ and PM_{10}), ozone (O_3), and oxides of sulfur (SO_X). The NAAQS establish various standards, either primary[171] or secondary,[172] for each pollutant with varying averaging times. Standards with short averaging times (e.g., 1-hour, 8-hour, and 24-hour) were developed to prevent the acute health effects from short-term exposure at high concentrations. Longer averaging periods (e.g., 3 months or annual) are intended to prevent chronic health effects from long-term exposure. A description of the NAAQS is presented in Appendix E.

In addition to the NAAQS, there are standards for hazardous air pollutants (HAP), which are those typically associated with specific industrial processes such as chromium electroplating (hexavalent chromium), dry cleaning (perchloroethylene), and solvent degreasing (halogenated solvents) (USEPA, 2011b). HAPs can have severe adverse impacts on human health and the

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[164] Topography: The unique features and shapes of the land (e.g., valleys and mountains).
[165] Equivalent to 1 milligram per liter (mg/L).
[166] Averaging Time: "The period over which data are averaged and used to verify proper operation of the pollution control approach or compliance with the emissions limitation or standard." (USEPA, 2015ab)
[167] Attainment areas: Any area that meets the national primary or secondary ambient air quality standard for the pollutant. (USEPA, 2015ac).
[168] Nonattainment areas: Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant. (USEPA, 2015ac)
[169] Maintenance areas: An area that was previously nonattainment, but has met the national primary or secondary ambient air quality standards for the pollutant, and has been designated as attainment. (USEPA, 2015ac)
[170] Unclassifiable areas: Any area that cannot be classified on the basis of available information as meeting the national primary or secondary air quality standard for a pollutant. (USEPA, 2015ac)
[171] Primary standard: The primary standard is set to provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. (USEPA, 2014d)
[172] Secondary standards: The secondary standard is set to provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. (USEPA, 2014d)

environment, including increased risk of cancer, reproductive issues, or birth defects. HAPs are federally regulated under the CAA via the National Emission Standards for Hazardous Air Pollutants (NESHAPs). USEPA developed the NESHAPs for sources and source categories emitting HAPs that pose a risk to human health. Appendix E presents a list of federally regulated HAPs.

In conjunction with the federal NAAQS, New York maintains its own air quality standards, the New York Ambient Air Quality Standards (NYAAQS). While state air quality standards typically mimic national air quality standards, New York established separate air quality standards based on four different classification levels (Table 11.1.12-1). These classification levels represent different land uses associated with varying social and economic development, and potential for pollution in the state. Additionally, New York established standards for pollutants not addressed by the NAAQS such as beryllium and fluorides. Table 11.1.12-2 presents an overview of the NYAAQS as defined by NYSDEC regulations, Chapter III part 257.

Table 11.1.12-1: New York State Air Quality Area Classification Definitions

Class	Description
I	Predominantly used for timber, agricultural crops, dairy farming, or recreation. Habitation and industry sparse.
II	Predominantly single and two family residences, small farms, and limited commercial services and industrial development.
III	Densely populated, primarily commercial office buildings, department stores, and light industries in small and medium metropolitan complexes, or suburban areas of limited commercial and industrial development near large metropolitan complexes.
IV	Densely populated, primarily commercial office buildings, department stores and industries in large metropolitan complexes, or areas of heavy industry.

Source: (NYSDEC, 2015cb)

Table 11.1.12-2: New York Ambient Air Quality Standards (NYAAQS)

Pollutant	Averaging Time	Class	Level	Notes
Beryllium	1-month	All	0.01 $\mu g/m^3$	----
CO	8-hour	All	9 ppm	No more than once per year.
	1-hour	All	35 ppm	No more than once per year.
Dustfall[173]	30-day	I	0.30 mg/cm^2	No more than 6 out of 12 consecutive months may exceed.
		II	0.30 mg/cm^2	
		III	0.40 mg/cm^2	
		IV	0.60 mg/cm^2	
	30-day	I	0.45 mg/cm^2	No more than 2 out of 12 consecutive months may exceed.
		II	0.45 mg/cm^2	
		III	0.60 mg/cm^2	
		IV	0.90 mg/cm^2	
Fluorides (Gaseous)	1-month	All	1.0 ppb (0.8 $\mu g/m^3$)	Gaseous fluorides in air (ppm parts of air) as F-all levels. (25 ºC, 760 mm Hg). Gaseous fluorides in air

173 Dustfall: "Settleable particulates," or dustfall, is normally in the size range greater than 10 μ, and suspended particulates range below 10 μ in diameter. (NYSDEC, 2015cb)

Pollutant	Averaging Time	Class	Level	Notes
	1-week	All	2.0 ppb (1.65 µg/m^3)	collected and analyzed by methods acceptable to the commissioner.
	24-hour	All	3.5 ppb (2.85 µg/m^3)	
	12-hour	All	4.5 ppb (3.7 µg/m^3)	
Fluorides (Total)	6-month (growing season)	All	40 ppm	Total fluorides, ppm, dry weight basis (as F) in and on forage for consumption by grazing ruminants. Total fluorides in and on forage is determined by fusion of a representative sample by the Schoniger flash oxygen combustion method and analysis by specific ion electrode* or other methods acceptable to the commissioner.
	60-day	All	60 ppm	
	30-day	All	80 ppm	
H_2S	1-hour	All	0.01 ppm (14 µg/m^3)	----
Hydrocarbons	3-hour	All	0.24 ppm	Average from 6am to 9am. Must not exceed more than once in any 12 consecutive months. Corresponds to federal standard of 160 µg/m^3 (at temperature of 25 ^{o}C and pressure of 760 mm of mercury).
NO_X	Annual	All	0.05 ppm	During any 12 consecutive months, the annual average of the 24-hour concentrations shall not exceed 0.05 ppm (100 µg/m^3) in all levels.
Photochemical Oxidants[174]	1-hour	All	0.08 ppm	No more than once in 12 consecutive months. Includes ozone, peroxyacyl, nitrates, and organic peroxides.
Particulates	24-hour	All	250 µg/m^3	----
	Annual	I	45 µg/m^3	----
		II	55 µg/m^3	----
		III	65 µg/m^3	----
		IV	75 µg/m^3	----
	30-day	I	80 µg/m^3	----
		II	100 µg/m^3	----
		III	115 µg/m^3	----
		IV	135 µg/m^3	----
	60-day	I	70 µg/m^3	----
		II	85 µg/m^3	----
		III	95 µg/m^3	----
		IV	115 µg/m^3	----
	90-day	I	65 µg/m^3	----
		II	80 µg/m^3	----
		III	90 µg/m^3	----
		IV	105 µg/m^3	----
SO_2	3-hour	All	0.25 ppm	99% of average over 12 consecutive months. Corresponds to federal standard of 1,300 µg/m^3 (at temperature of 25 ^{o}C and pressure of 760 mm or mercury).
	3-hour	All	0.50 ppm	Maximum measurement.
	24-hour	All	0.10 ppm	99% of average over 12 consecutive months.

[174] Photochemical Oxidants: "Substances in the atmosphere which are produced when reactive organic substances, principally hydrocarbons, and nitrogen oxides are exposed to sunlight." (NYSDEC, 2015cb)

Pollutant	Averaging Time	Class	Level	Notes
	24-hour	All	0.14 ppm	Maximum measurement. Corresponds to federal standard of 365 µg/m^3 (at temperature of 25 ºC and pressure of 760 mm of mercury).
	Annual	All	0.03 ppm	Corresponds to federal standard of 80 µg/m^3 (at temperature of 25 ºC and pressure of 760 mm of mercury).

Source: (NYSDEC, 2015cb)

Title V Operating Permits/State Operating Permits

New York has authorization to issue CAA Title V operating permits on behalf of the USEPA, as outlined in 40 CFR 70. The Title V program refers to Title V of the CAA that governs permitting requirements for major industrial air pollution sources and consolidates all CAA requirements for the facility into one permit. The overall goal of the Title V program is to "reduce violations of air pollution laws and improve enforcement of those laws." Chapter III subpart 201-6 of NYSDEC regulation describes the applicability of Title V operating permits. New York requires Title V operating permits for any major source if it emits or has the potential to emit pollutants in excess of the major source thresholds (see Table 11.1.12-3). The permit issued to a facility contains both state and federal portions and incorporates a reporting schedule (USEPA, 2014e).

Table 11.1.12-3: Major Air Pollutant Source Thresholds

Major Air Pollutant Source	Thresholds
Any Pollutant	100 Tons per Year
Single HAP	10 Tons per Year
Total/Cumulative HAPs	25 Tons per Year

Source: (USEPA, 2014e)

Exempt Activities

Select activities, as defined by the NYSDEC regulation Chapter III subpart 201-3.3, are exempt from the registration and permitting provisions of subparts 201-4, 201-5, and 201-6. The following activities are considered exempt from registration and permitting requirements, however, would need to be considered in NEPA analyses and General Conformity applicability determination:

- "Stationary or portable internal combustion engines meeting the following criteria:
  - Liquid or gaseous fuel powered, inside the New York City (NYC) metropolitan area (or the Orange County towns identified in Chapter III subpart 201-3.2), and has a maximum mechanical power rating of less than 200 brake horsepower;
  - Liquid or gaseous fuel powered, outside the NYC metropolitan area (or the Orange County towns identified in Chapter III subpart 201-3.2), and has a maximum mechanical power rating of less than 400 brake horsepower; or
  - Gasoline powered and a maximum mechanical power rating of less than 50 break horsepower."
- Emergency power generating stationary combustion engine.

   - "A stationary internal combustion engine that operates as a mechanical or electrical power source only when the usual supply of power is unavailable, and operates for no more than 500 hours per year. The 500 hours of annual operation for the engine include operation during emergency situations, routine maintenance, and routine exercising (for example, test firing the engine for one hour a week to ensure reliability). A stationary internal combustion engine used for peak shaving generation is not an emergency power generating stationary internal combustion engine" (NYSDEC, 2015cb).
- Hydrogen fuel cells.

Temporary Emissions Sources Permits

New York defines a temporary emission source as: "(1) an emission source that is transient in nature and would be operated at a facility for a single period of less than 90 consecutive days commencing from the first day of operation, or (2) an emission source that would be constructed and operated for less than 30 days per calendar year" (NYSDEC, 2015cb). Temporary emission sources do not require permitting or registration. A general permit or registration may be necessary if equipment used as part of an action does not meet the requirements of Chapter III subpart 201-1.11.

State Preconstruction Permits

The NYSDEC requires preconstruction permits pursuant to the State Environmental Quality Review Act (SEQR) and New Source Review (NSR) (NYSDEC, 2015cb). Preconstruction permitting is only required for sources that have potential emissions that exceed the major source thresholds (see Table 11.1.12-3) or are a new emissions site at a Title V-permitted facility. Any new emissions source or facility that is not considered a Major Source or is not an exempt/trivial activity (as detailed in Chapter III section 201-3) are considered Minor Facilities. Minor Facilities (as defined by NYSDEC Chapter III part 201-4.1) must submit a registration to the NYSDEC providing the information outlined in Part 201-4.3 prior to construction.

General Conformity

Established under Section 176(c)(4) of the CAA, the General Conformity Rule ensures that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state's plans to meet national standards for air quality outlined in the state implementation plan (SIP) (USEPA, 2013b). An action in designated nonattainment and maintenance areas would be evaluated for the emission of those particular pollutants under the General Conformity Rule through an applicability analysis. Pursuant to Title 40 CFR 93.153(d)(2) and (e), federal actions "in response to emergencies which are typically commenced on the order of hours or days after the emergency" and actions "which are part of part of a continuing response to emergency or disaster" that are taken up to 6 months after beginning response activities, will be exempt from any conformity determinations (GPO, 2010).

The estimated pollutant emissions are compared to *de minimis*[175] levels. These values are the minimum thresholds for which a conformity determination must be performed (Table 11.1.12-4).

[175] Small amount or minimal.

All New York counties lie in the Ozone Transport Region (OTR). As a result, lower *de minimis* thresholds for VOCs and NO_X could apply depending on the attainment status of a county.

Table 11.1.12-4: De Minimis Levels

Pollutant	Area Type	TPY
Ozone (VOC or NO_X)	Serious Nonattainment	50
	Severe Nonattainment	25
	Extreme Nonattainment	10
Ozone (NO_X)	Marginal and Moderate Nonattainment inside an OTR	100
	Maintenance	100
Ozone (VOC)	Marginal and Moderate Nonattainment inside an OTR	50
	Maintenance within an OTR	50
CO, SO_2, NO_2	All Nonattainment and Maintenance	100
PM_{10}	Serious Nonattainment	70
	Moderate Nonattainment and Maintenance	100
$PM_{2.5}$ (Direct Emissions) (SO_2) (NO_X (unless determined not to be a significant precursor)) (VOC or ammonia (if determined to be significant precursors))	All Nonattainment and Maintenance	100
Lead	All Nonattainment and Maintenance	25

Source: (GPO, 2010)

If an action does not result in an emissions increase above the *de minimis* levels in Table 11.1.12-4, then a conformity determination is not required. If the applicability analysis shows that the total direct and indirect emissions are above the *de minimis* levels in Table 11.1.12-4, then the action must undergo a conformity determination. The federal agency must first show that the action would meet all SIP control requirements and that any new emissions would not cause a new violation of the NAAQS. To demonstrate conformity,[176] the agency would have to fulfill one or more of the following:

- Show any emissions increase is specifically identified and accounted for in the respective state's SIP;
- Receive acknowledgement from the state that any increase in emissions would not exceed the SIP emission budget;
- Receive acknowledgement from the state to revise the SIP and include emissions from the action;
- Show the emissions would be fully offset by implementing reductions from another source in the same area; and
- Conduct air quality modeling that demonstrates the emissions would not cause or contribute to new violations of the NAAQS, or increase the frequency or severity of any existing violations of the NAAQS (USEPA, 2010).

[176] Conformity: Compliance with the State Implementation Plan.

State Implementation Plan Requirements

The New York SIP is composed of many related actions to ensure ambient air concentrations of the six criteria pollutants comply with the NAAQS. New York's SIP is a conglomeration of separate actions taken for each of the pollutants. All of New York's SIP actions are codified under 40 CFR Part 52 Subpart HH. A list of all SIP actions for all six criteria pollutants can be found on NYSDEC's website: http://www.dec.ny.gov/chemical/8403.html (NYSDEC, 2015cc).

11.1.12.3 Environmental Setting: Ambient Air Quality

Nonattainment Areas

The USEPA classifies areas as attainment, nonattainment, maintenance, or unclassifiable for six criteria pollutants. When evaluating an area's air quality against regulatory thresholds (i.e., permitting and general conformity), maintenance areas are often combined with nonattainment, while unclassifiable areas are combined with attainment areas. Figure 11.1.12-1 and Table 11.1.12-5 present the current nonattainment areas in New York as of January 30, 2015. The year(s) listed in the table for each pollutant indicate the date(s) when USEPA promulgated an ambient air quality standard for that pollutant. Note certain pollutants have more than one standard in effect (e.g., $PM_{2.5}$, O_3, and SO_x). Unlike Table 11.1.12-5, Figure 11.1.12-1 does not differentiate between standards for the same pollutant. Additionally, given that particulate matter is the criteria pollutant of concern, PM_{10} and $PM_{2.5}$ merge in the figure to count as a single pollutant.

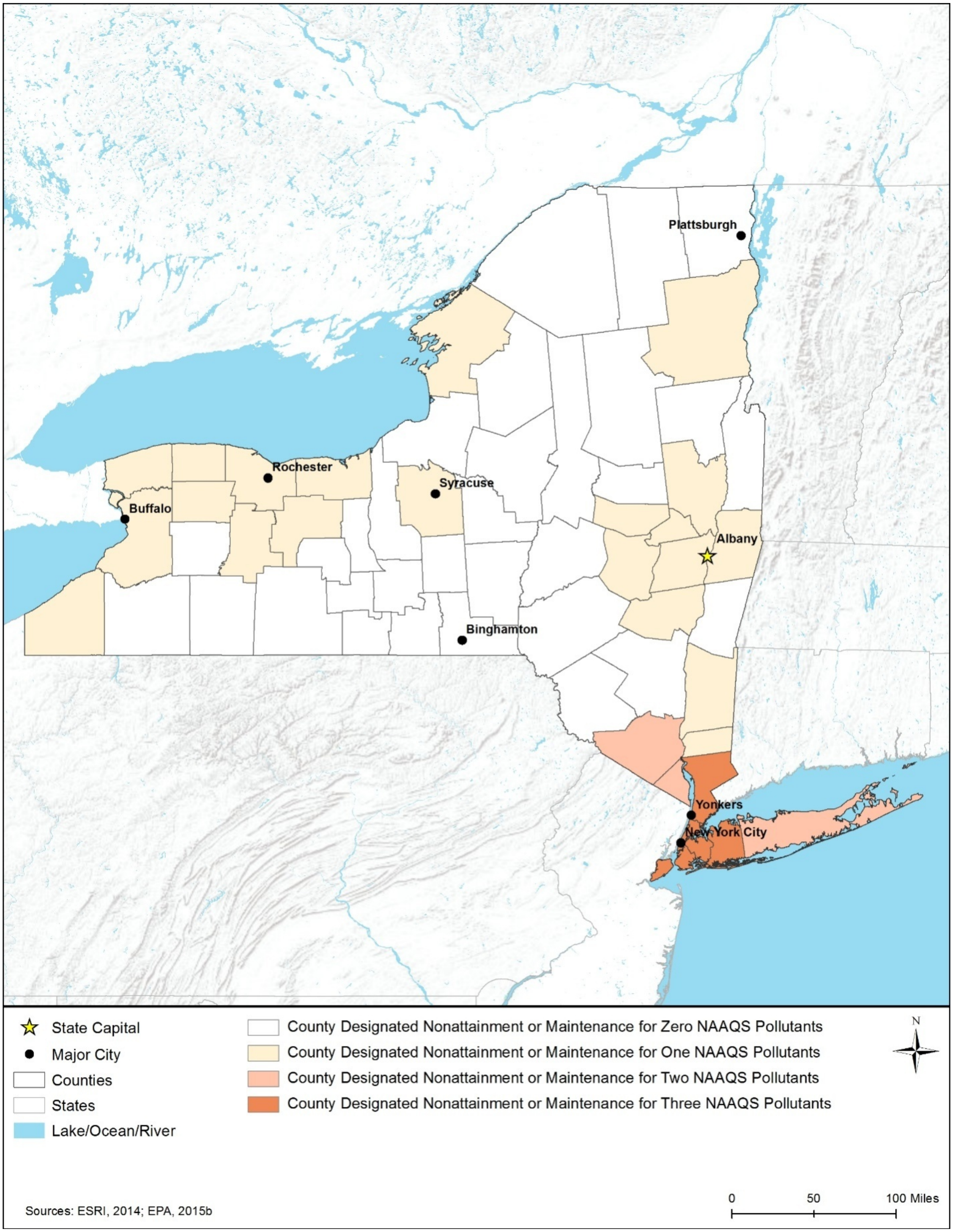

Figure 11.1.12-1: Nonattainment and Maintenance Counties in New York

Table 11.1.12-5: New York Nonattainment and Maintenance Areas by Pollutant Standard and County

County	Pollutant and Year USEPA Implemented Standard										
	CO	Lead		NO_X	PM_{10}	$PM_{2.5}$		O_3		SO_X	
	1971	1979	2008	1971	1987	1997	2006	1997	2008	1971	2010
Albany								X-5			
Bronx	M					M	M	X-4	X-5		
Chautauqua								X-4	X-5		
Dutchess								X-4			
Erie								X-5			
Essex								X-5			
Genesee								X-5			
Greene								X-4			
Jefferson								X-4			
Kings	M					M	M	X-4	X-5		
Livingston								X-5			
Monroe								X-5			
Montgomery								X-5			
Nassau	M					M	M	X-4	X-5		
New York	M				X-4	M	M	X-4	X-5		
Niagara								X-4			
Onondaga	X-1										
Ontario								X-5			
Orange						M	M	X-4			
Orleans								X-5			
Putnam								X-4			
Queens	M					M	M	X-4	X-5		
Rensselaer								X-5			
Richmond	M					M	M	X-4	X-5		
Rockland						M	M	X-4	X-5		
Saratoga								X-5			
Schenectady								X-5			
Schoharie								X-5			
Suffolk						M	M	X-4	X-5		
Wayne								X-5			
Westchester	M					M	M	X-4	X-5		

Source: (USEPA, 2015ad)

X-1 = Nonattainment Area (Extreme)

X-2 = Nonattainment Area (Severe)

X-3 = Nonattainment Area (Serious)

X-4 = Nonattainment Area (Moderate)

X-5 = Nonattainment Area (Marginal)

X-6 = Nonattainment Area (Unclassified)

M = Maintenance Area

Air Quality Monitoring and Reporting

The NYSDEC measures air pollutants at more than 50 sites across the state as part of the National Air Monitoring Stations Network and the State and Local Air Monitoring Stations Network. Annual New York State Ambient Air Quality Reports are prepared, containing pollutant data summarized by region. NYSDEC reports real-time pollution levels of O_3 on their website to inform the public, as O_3 is the main pollutant of concern in New York.

Throughout 2014, O_3 measurements exceeded the federal standard of 0.075 ppm eight times in stations across the NYC Metro Area and twice, at Perch River (Jefferson county) and Williamson (Wayne county) stations, in New York (NYSDEC, 2014c). No other criteria pollutants exceed federal standards (NYSDEC, 2014d). During this same timeframe, O_3 measurements exceeded the state standard of 0.08 ppm three times, in Riverhead (Suffolk county), Susan Wagner (Richmond county), and White Plains (Westchester county) stations, across the New York City Metro Area (NYSDEC, 2014c). No other criteria pollutants exceed state standards (NYSDEC, 2014d).

Air Quality Control Regions

EPA classified all land in the United States as a Class I, Class II, or Class III Federal Air Quality Control Region (AQCR). These are different from the air quality classification levels defined in Table 11.1.12-1 as part of the NYAAQS. Class I areas include international parks, national wilderness areas which exceed 5,000 acres in size, national memorial parks which exceed 5,000 acres in size, and national parks which exceed 6,000 acres in size. Class I areas cannot be re-designated as Class II or Class III and are intended to maintain pristine air quality. Although USEPA developed the standards for a Class III AQCR, to date they have not actually classified any area as Class III. Therefore, any area that is not classified as a Class I area is, by default, automatically designated as a Class II AQCR (USEPA, 2013c).

In a 1979 USEPA memorandum, the Assistant Administrator for Air, Noise, and Radiation (Hawkins, 1979) advised USEPA Regional Offices to provide notice to the Federal Land Manager (FLM) of any facility subject to the Prevention of Significant Deterioration (PSD) permit requirements and within 100 kilometers[177] of a Class I area. "The USEPA's policy is that FLMs should be notified by the Regional Office about any project that is within 100 kilometers of a Class I area. For sources having the capability to affect air quality at greater distances, notification should also be considered for Class I areas beyond 100 kilometers" (Page, 2012). The 2005 USEPA guidelines for air quality modeling do not provide a precise modeling range for Class I areas.

PSD applies to new major sources or major modifications at existing sources for pollutants where the source is in an attainment or unclassifiable area. An air quality analysis is required for sources subject to PSD requirements and generally consists of using a dispersion model to evaluate emission impacts to the area. "Historically, the USEPA guidance for modeling air quality impacts under the PSD program has tended to focus more on the requirements for a Class II modeling analysis. Such guidance has provided that applicants need not model beyond the point of significant impact or the source or 50 kilometers[178] (the normal useful range of USEPA-approved Gaussian plume models" (Seitz, 1992).

[177] The memorandum and associated guidance use kilometers. 100 kilometers is equal to about 62 miles.
[178] The memorandum and associated guidance use kilometers. 50 kilometers is equal to about 31 miles.

New York does not contain any Federal Class I areas; all land within the state is classified as Class II (USEPA, 2012c). If an action is considered major source and consequently subject to PSD requirements, the air quality impact analysis need only to analyze the impacts to air quality within 100 kilometers from the source (USEPA, 1992). Vermont does have a Class I area where the 100-kilometer buffer intersects a few New York counties. Any PSD-applicable action within these counties would require FLMs notification from the appropriate Regional Office. Figure 11.1.12-2 provides a map of New York highlighting all relevant Class I areas and all areas within the 100-kilometer radiuses. The numbers next to each of the highlighted Class I areas in Figure 11.1.12-2 correspond to the numbers and Class I areas listed in Table 11.1.12-6.

Table 11.1.12-6: Relevant Federal Class I Areas

#[a]	Area	Acreage	State
1	Lye Brook Wilderness	12,430	VT

Source: (USEPA, 2012c)

[a] The numbers correspond to the shaded regions in Figure 11.1.12-2.

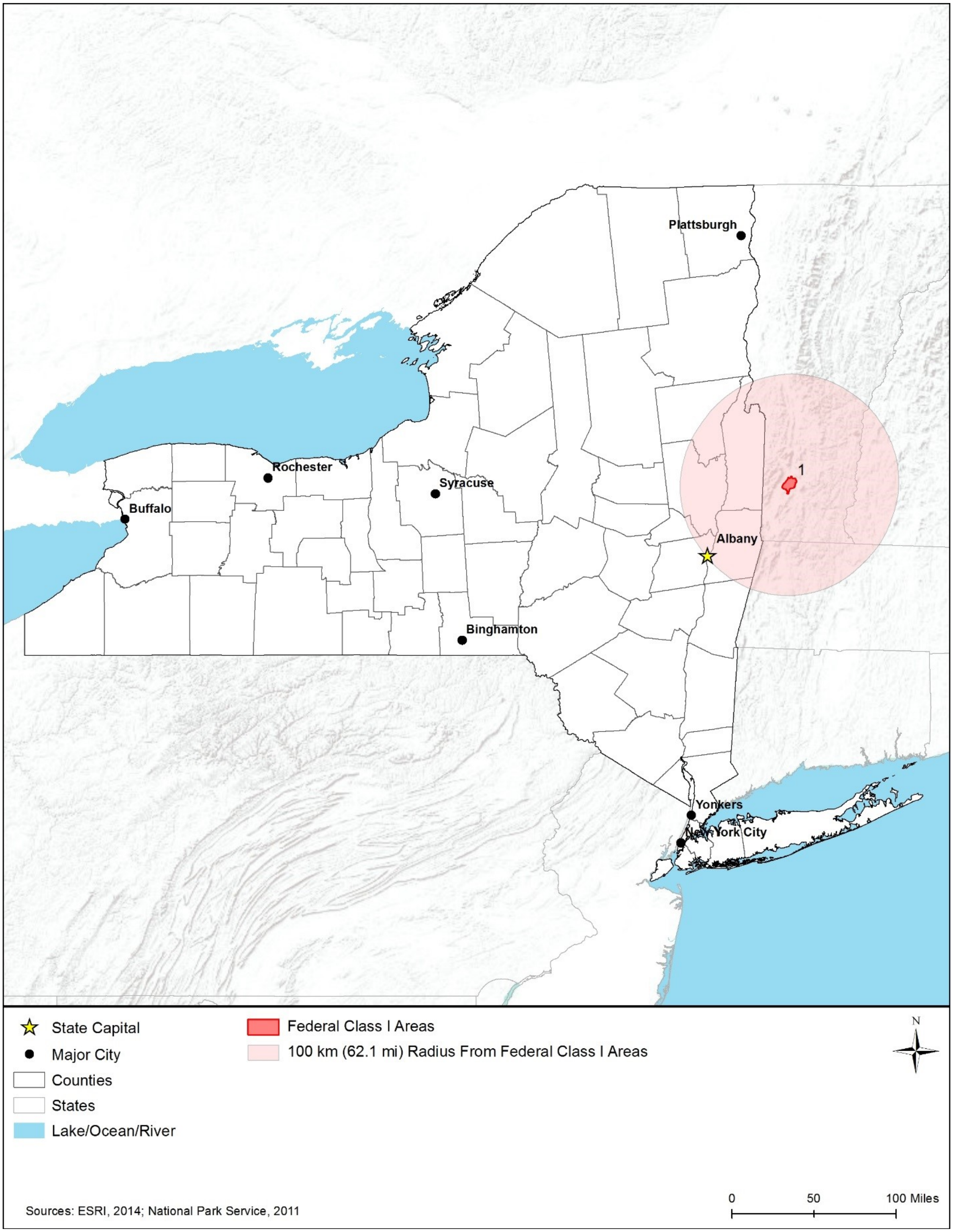

Figure 11.1.12-2: Federal Class I Areas with Implications for New York

11.1.13 Noise

This section presents a discussion of a basic understanding of environmental noise, background/ambient noise levels, noise standards, and guidelines.

11.1.13.1 Definition of the Resource

Noise is caused by pressure variations that the human ear can detect and is often defined as unwanted sound (USEPA, 2012d). Noise is one of the most common environmental issues that interferes with normal human activities and otherwise diminishes the quality of the human environment. Typical sources of noise that result in this type of interference in urban and suburban surroundings includes interstate and local roadway traffic, rail traffic, industrial activities, aircraft, and neighborhood sources like lawn mowers, leaf blowers, etc.

The effects of noise can be classified into three categories:

- Noise events that result in annoyance and nuisance;
- Interference with speech, sleep, and learning; and
- Physiological effects such as hearing loss and anxiety.

Fundamentals of Noise

For environmental noise analyses, a noise metric refers to the unit that quantitatively measures the effect of noise on the environment. The unit used to describe the intensity of sound is the decibel (dB). Audible sounds range from 0 dB ("threshold of hearing") to about 140 dB ("threshold of pain"). The normal audible frequency range is approximately 20 Hz to 20 kHz (FAA, 2015i). The A-weighted scale, denoted as dBA, approximates the range of human hearing by filtering out lower frequency noises, which are not as damaging as the higher frequencies. The dBA scale is used in most noise ordinances and standards.

Measurements and descriptions of noise (i.e., sounds) are based on various combinations of the following factors (Federal Transit Authority, 2006):

- The vibration frequency characteristics of the sound, measured as sound wave cycles per second [Hertz (Hz)], determines the pitch of the sound.
- The total sound energy radiated by a source, usually reported as a sound power level.
- The actual air pressure changes experienced at a particular location, usually measured as a sound pressure level (SPL) (the frequency characteristics and SPL combine to determine the loudness of a sound at a particular location).
- The duration of a sound.
- The changes in frequency characteristics or pressure levels through time.

Figure 11.1.13-1 presents the sound levels of typical events that occur on a daily basis in the environment. For example, conversational speech is measured at about 55 to 60 dBA, whereas a band playing loud music may be as high as 120 dBA.

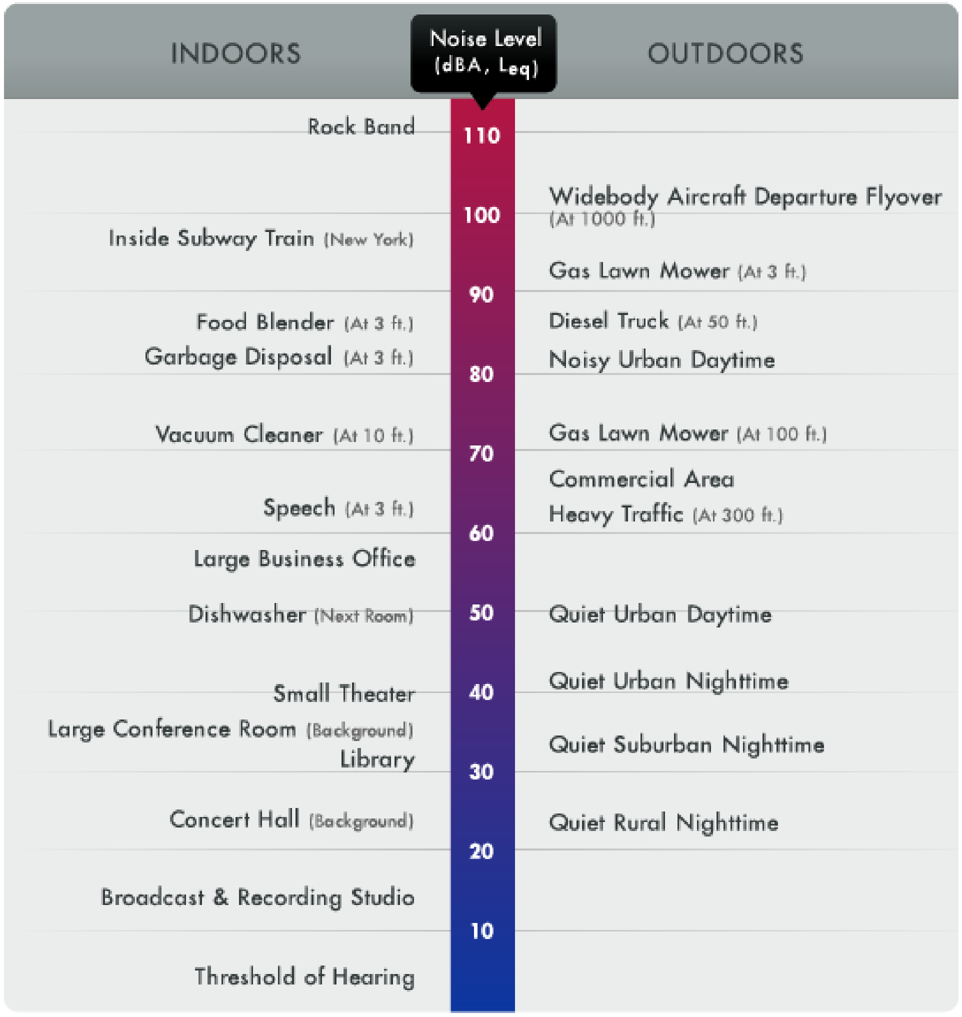

Figure 11.1.13-1: Sound Levels of Typical Sounds

Leq: Equivalent Continuous Sound Level
Source: (Sacramento County Airport System, 2015)
Prepared by: Booz Allen Hamilton, 2005

Because of the logarithmic unit of measurement, sound levels cannot be added or subtracted linearly. However, several methods of estimating sound levels can be useful in determining approximate sound levels. First, if two sounds of the same level are added, the sound level increases by approximately three dB (for example: 60 dB + 60 dB = 63 dB). Secondly, the sum of two sounds of a different level is slightly higher than the louder level (for example: 60 dB + 70 dB = 70.4 dB).

The changes in human response to changes in dB levels is categorized as follows (Federal Transit Authority, 2006):

- A 3-dB change in sound level is considered a barely noticeable difference;
- A 5-dB change in sound level will typically result in a noticeable community response; and
- A 10-dB change, which is generally considered a doubling of the sound level, almost certainly causing an adverse community response.

In general, ambient noise levels are higher during the day than at night and typically this difference is about 10 dB (USEPA, 1973). Ambient noise levels can differ considerably if the environment is urban, suburban, or rural.

11.1.13.2 Specific Regulatory Considerations

As identified in Appendix C, the Noise Control Act of 1972, along with its subsequent amendments (e.g., Quiet Communities Act of 1978 [42 U.S.C. Parts 4901−4918]), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Although no federal noise regulations exist, the USEPA has promulgated noise guidelines (USEPA, 1974). Similarly, most states have no quantitative noise-limit regulations.

New York does not have any applicable statewide noise laws; however, many cities and towns may have local noise ordinances to manage community noise levels. The noise limits specified in such ordinances are typically applied to define noise sources and specify a maximum permissible noise level. Large cities and towns, such as New York City, are likely to have different regulations than rural or suburban communities largely due to the population density and difference in ambient noise levels (NYC, 2011).

11.1.13.3 Environmental Setting: Ambient Noise

The range and level of ambient noise in New York varies widely based on the area and environment of the area. The population of New York can choose to live and interact in areas that are large cities, rural communities and national and state parks. Figure 11.1.13-1 illustrates noise values for typical community settings and events that are representative of what the population of New York may experience on a day-to-day basis. These noise levels represent a wide range and are not specific to New York. As such, this section describes the areas where the population of New York can potentially be exposed to higher than average noise levels.

- **Urban Environments:** Urban areas are likely to have higher noise levels on a daily basis due to highway traffic (70 to 90 dBA), construction noise (90 to 120 dBA), and outdoor conversations (e.g., small/large groups of people) (60 to 90 dBA) (USDOI, 2008). The areas that are likely to have the highest ambient noise levels in the state are New York (and its neighboring boroughs and cities), Albany, Buffalo, Syracuse, and Rochester.
- **Airports:** Areas surrounding airports tend to be more sensitive to noise due to aircraft operations that occur throughout the day. A jet engine aircraft can produce between 130 to 160 dBA in its direct proximity (FAA, 2007). However, commercial aircraft are most likely to emit noise levels between 70 to 100 dBA depending of the type of aircraft and associated engine (FAA, 2012). This noise will be perceived differently based on the altitude of the aircraft and its distance to the point of measurement. Airport operations are primarily arrivals and departures of commercial aircraft but based on the type of airport can include touch-and-go operations that are typical of general aviation airports and military airfields. The location of most commercial airports are in the proximity of urban communities; therefore, aircraft operations (arrivals/departures) can result in noise exposure in the surrounding areas to be at higher levels with the potential for increased noise levels during

peak operation times (early morning and evenings), when there is an increase in air traffic. The noise levels in areas surrounding commercial airports can have significantly higher ambient noise levels than in other areas. In New York, New York City's John F. Kennedy (JFK), LaGuardia International Airports (LGA), Buffalo Niagara International Airport (BUF), Greater Rochester International Airport (ROC), and Albany International Airport (ALB) have more than 1 million annual operations combined, with JFK accounting for approximately 430,000 operations annually (FAA, 2015j). These operations result in increased ambient noise levels in the surrounding communities. See Section 11.1.7, Land Use, Recreation, and Airspace and Table 11.1.7-8 for more information about airports in the state.

- **Highways:** Communities near major highways also experience higher than average noise levels when compared to areas that are not in close proximity to a highway (NYSDOT, 2015n). There are a number of major highways within the state that may contribute to higher ambient noise levels for residents living in those areas. The major highways in the state tend to have higher than average ambient noise levels on nearby receptors, ranging from 52 to 75 dBA (NYSDOT, 2015n). See Section 11.1.1, Infrastructure, and Figure 11.1.1-1 for more information about the major highways in the state.
- **Railways:** Like highways, railways tend to have higher than average ambient noise levels for residents living in close proximity (Federal Transit Authority, 2006). Railroad operations can produce noise ranging from 70 dBA for an idling locomotive to 115 dBA when the locomotive engineer rings the horn while approaching a crossing (USDOT, 2015c). New York has multiple rail corridors with high levels of commercial and commuter rail traffic. These major rail corridors extend from New York City to Albany, New York City to Scranton (PA), New York City to Long Island, Albany to Syracuse, Rochester to Buffalo, and Buffalo to Chicago (IL). There are also a number of other rail corridors that join these major rail lines and connect with other cities (NYDOT, 2013b). See Section 11.1.1, Public Safety Infrastructure, and Figure 11.1.1-1 for more information about rail corridors in the state.
- **National and State Parks:** The majority of national and state parks are likely to have lower than average ambient noise levels given their size and location in wilderness areas. National and state parks, historic areas, and monuments are protected areas with one aspect to "maintain the resilience of the natural soundscape"[179] (Freimund & Nicholas, 2016). These areas typically have lower noise levels, as low as 30 to 40 dBA (NPS, 2014f). New York has 22 National Parks and 169 state parks (National Parks Conservation Association, 2015) (New York State, 2015b). Visitors to these areas expect lower ambient noise conditions than the surrounding urban areas. See Section 11.1.7, Land Use, Recreation, and Airspace and Section 11.1.8, Visual Resources for more information about national and state parks in New York.

[179] A soundscape is the acoustic environment that encompasses an area, and includes natural and human/manmade sounds.

11.1.13.4 Sensitive Noise Receptors

Noise-sensitive receptors include residences, schools, medical facilities, places of worship, libraries, churches, nursing homes, concert halls, playgrounds, and parks. Sensitive noise receptors are typically areas where the intrusion of noise can disrupt the use of the environment. A quiet urban area usually has a typical noise level in the daytime of 50 dBA, and 40 dBA during the evening. Noise levels in remote wilderness and rural nighttime areas are usually 30 dBA (BLM, 2014)**.** Most cities, towns, and villages in New York have at least one school, church, or park, in addition to likely having other noise-sensitive receptors. There are most likely thousands of sensitive receptors in the New York.

11.1.14 Climate Change

11.1.14.1 Definition of the Resource

Climate change, according to the Intergovernmental Panel on Climate Change (IPCC), is defined as "…a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or human activity." (IPCC, 2007)

Accelerated rates of climate change are linked to an increase in atmospheric concentrations of greenhouse gas (GHG) caused by emissions from human activities such as burning fossil fuels to generate electricity (USEPA, 2012e). The IPCC is now 95 percent certain that humans are the main cause of current global warming (IPCC, 2013). Human activities result in emissions of four main GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and halocarbons (a group of gases containing fluorine, chlorine, or bromine) (IPCC, 2007). The common unit of measurement for GHGs is metric tons of CO_2-equivalent (MT CO_2e), which equalizes for the different global warming potential of each type of GHG. Where this document references emissions of CO_2 only, the units are in million metric tons (MMT) CO_2. Where the document references emissions of multiple GHGs, the units are in MMT CO_2e.

The IPCC reports that "global concentrations of these four GHGs have increased significantly since 1750" with "Atmospheric concentrations of CO_2 increased from 280 parts per million (ppm) of carbon in 1750 to 379 ppm of carbon in 2005" (IPCC, 2007). The atmospheric concentration of CH_4 and N_2O have increased from pre-industrial values of about 715 and 270 parts per billion (ppb) to 1774 and 319 ppb, respectively, in 2005 (IPCC, 2007). In addition, the IPCC reports that human activities are causing an increase in various hydrocarbons from near-zero pre-industrial concentrations (IPCC, 2007).

Both the GHG emissions effects of the Proposed Action and Alternatives, and the relationships of climate change effects to the Proposed Action and Alternatives, are considered in this PEIS (see Section 11.2, Environmental Consequences). Existing climate conditions in the project area are described first by state and sub-region, where appropriate, and then by future projected climate scenarios. The discussion focuses on the following climate change impacts: 1) temperature; 2) precipitation; 3) sea level; and 4) severe weather events (including tropical storms, tropical cyclones, and hurricanes).

11.1.14.2 Specific Regulatory Considerations

The pertinent federal laws relevant to the protection and management of climate change are summarized in Appendix C. New York and New York City have established goals and regulations to reduce GHG emissions to combat climate change. As shown in Table 11.1.14-1, three key state laws/regulations are the primary policy drivers on climate change preparedness and GHG emissions.

Table 11.1.14-1: Relevant New York Climate Change Statues and Regulations

State Laws/Regulations	Regulatory Agency	Applicability
EO 24: Establishing a Goal to Reduce GHG Emissions 80% by 2050 and Preparing a Climate Action Plan	New York State	EO 24 set a goal to reduce GHG emissions by 80% below level emitted in 1990 by year 2050 and established the New York State Climate Action Council (CAC) with the directive to write a State Climate Action Plan. The CAC released in 2009 an interim Climate Action Plan, which included an inventory and forecast of GHG emissions.
New York Community Risk and Resiliency Act	New York State	Strengthen New York's preparedness for the effects of climate change and help protect communities against severe weather and sea level rise. Key requirements include: assessment of potential future climate risks related to storm surges, rising sea levels and any other conditions for certain permitting, funding, and regulatory decisions; preparation of official projections of climate risk every five years on January 1, starting in 2016, for NYSDEC and the Department of State to helplocal communities implement better pre-emptive defense against extreme weather.
Local Law 84: Benchmarking	City of New York	Sets a goal of reducing citywide emissions by 30% by 2030, and by 80% by 2050. In addition, it sets the goal of reducing citywide building emissions by 30% by 2025, and emissions by city government buildings by 35% by 2025.

Sources: (City of New York, 2009) (NYDEC, 2014) (NYDEC, 2009)

In addition, New York has established other goals that address various aspects of climate change such as sea-level rise. For example, New York City developed the Vision 2020, Comprehensive Waterfront Plan, which has a goal to identify and pursue strategies to increase the city's resilience to climate change and sea level rise (New York City, 2011). New York is also one of 10 states participating in the Regional Greenhouse Gas Initiative (RGGI), a cooperative effort to help lower GHG emissions by 10 percent to 1990 levels by 2020 and 80 percent below 1990 levels by 2050 within the northeast region of the U.S. (RGGI, 2015).

11.1.14.3 New York Greenhouse Gas Emissions

Estimates of New York's total GHG emissions vary based on the source of the estimate. The Department of Energy's EIA collects and disseminates national-level emissions data on other GHGs such as methane (CH_4) and nitrous oxide (NO_x), but not at the state level (EIA, 2015k). The USEPA also collects and disseminates national-level GHG emissions data, but by economic sector, not by state (USEPA, 2015ae). Individual states have developed their own GHG inventories, which are updated with different frequencies and trace GHG in a variety of ways.

For the purposes of this PEIS, the EIA data on CO_2 emissions are used as the baseline metric to ensure consistency and comparability across the 50 states. However, if additional data sources on GHG emissions are available for a given state, including other GHGs such as CH_4, they are described and cited.

According to the EIA, New York emitted a total of 160.3 MMT of CO_2 in 2013. Transportation was the largest emitter, accounting for almost one-third of all CO_2 emissions. (Table 11.1.14-2) (EIA, 2015l). Annual emissions between 1980 and 2013 are presented in Figure 11.1.14-1. Between 1980 and approximately 2005, New York's CO_2 emissions fell (1980-1983), then rose (1983-1990), then fell and rose again (1990-1994, 1995 to 2000) after which they stabilized and then began a swift decline (2004-2012). In 2013, emissions increased very slightly. Overall declines have been led by the almost complete elimination of coal from electricity generation and industrial sectors, and reductions in emissions from petroleum products, even as emissions from natural gas increased. New York in 2013 was ranked 9th among the states for total CO_2 emissions in 2013 (EIA, 2015m), but was ranked lowest in the U.S. (not including the District of Columbia, which is lower) for per-capita CO_2 emissions (EIA, 2015m).

Table 11.1.14-2: New York CO_2 Emissions from Fossil Fuels by Fuel Type and Sector, 2013

Fuel Type (MMT)		Source (MMT)	
Coal	6.7	Residential	31.9
Petroleum Products	83.7	Commercial	22.6
Natural Gas	70.1	Industrial	9.5
		Transportation	65.7
		Electric Power	32.3
Total	**160.3**	**Total**	**160.5**

Source: (EIA, 2015l)

The New York State Climate Action Council (NYCAC) has conducted its own GHG inventory on behalf of the State, which includes CO_2 and other GHGs. According to NYCAC, in 2008, New York was responsible for over 270 MMT of CO_2e (i.e., all GHGs including CO_2) (New York Climate Action Council, 2010). Variation between EIA's estimates of GHG emissions and the NYCAC estimates can be attributed to differences in what was counted (i.e., the CAC counted all types of GHGs, whereas EIA only tracks CO_2). The NYCAC also included in its inventory GHGs emitted by other states as a result of electricity purchased from them by New York utilities (a consumption-based metric), an approach that EIA does not use (EIA, 2014). The majority of New York's GHG emissions (88 percent) is CO_2. Other major GHGs emitted in New York are CH_4 (6 percent), hydrofluorocarbons (3 percent), NO_x (2.2 percent), sulfur hexafluoride (SF_6) (0.21 percent) and perfluorocarbons (0.14 percent) (New York Climate Action Council, 2010).

Per capita GHG emissions tend to be lower "downstate" (i.e., close to or in New York City) than upstate, likely due to the higher use of public transportation in population centers. New York's total GHG emissions between 1990 and 2005 increased approximately 9 percent due to population growth, while per capita emissions remained constant, although the long-term trend is expected to move downward as more people move to population centers with public transportation and the overall population ages (New York Climate Action Council, 2010).

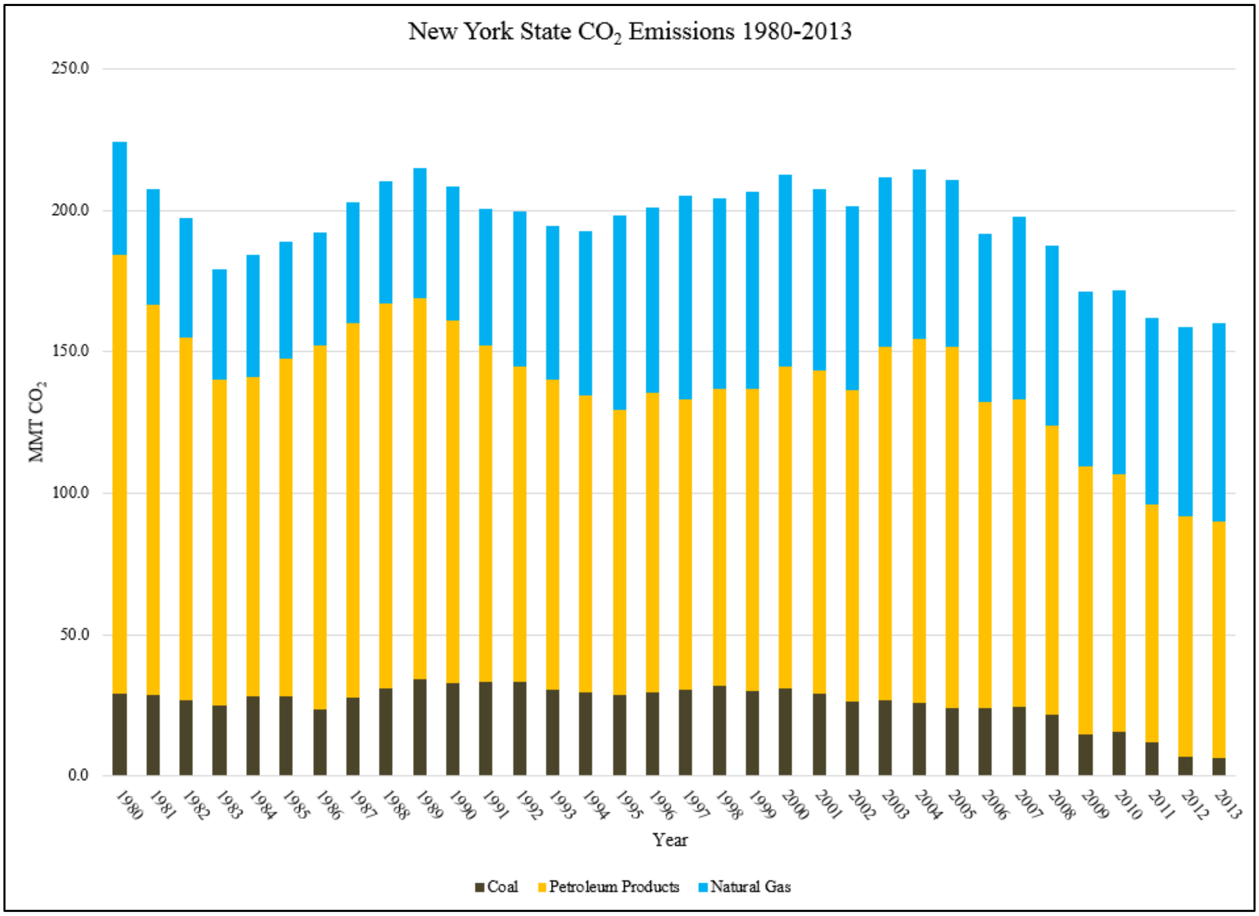

Figure 11.1.14-1: New York CO_2 Emissions from Fossil Fuels by Fuel Type 1980-2013

Source: (EIA, 2015l)

Future emissions scenarios calculated for the NYCAC report forecast GHG emissions remaining almost constant to 2030, with slight changes in emissions between different economic sectors and fuels. The NYCAC report identifies several sources of uncertainty in these projections, including population, electricity demand growth rates, future transportation fuel use, and interactions between these factors. For example, increased population in upstate New York would likely lead to an increase in per capita and absolute emissions, whereas if the population continued to shift to more populated areas with public transportation and more concentrated dwellings such as New York City, both absolute and per capita GHG emissions could likely decrease (New York Climate Action Council, 2010).

11.1.14.4 Environmental Setting: Existing Climate

The National Weather Service (NWS) defines climate as the “reoccurring average weather found in any particular place” (NWS, 2011a). The widely accepted division of the world into major climate categories is referred to as the Köppen-Geiger climate classification system. Climates within this system are classified based "upon general temperature profiles related to latitude" (NWS, 2011a). The first letter in each climate classification details the climate group. The Köppen-Geiger system further divides climates into smaller sub-categories based on precipitation and temperature patterns. The secondary level of classification details the seasonal precipitation, degree of aridity, and presence or absence of ice. The tertiary levels distinguish different monthly temperature characteristics (NWS, 2011b).

Across the U.S., the five most common climate groups are (A), (B), (C), (D), and (E). The majority of New York falls into climate group (D) (Figure 11.1.14-2). Climates classified as (D) are "moist continental mid-latitudinal climates," with "warm to cool summers and cold winters" (NOAA, 2015g). In (D) climates, the "average temperature of the warmest month is greater than 50 degrees Fahrenheit (°F), while the coldest month is less than negative 22 °F" (NOAA, 2015g). Winter months in (D) climate zones are cold and severe with "snowstorms, strong winds, and bitter cold from Continental Polar or Arctic air masses" (NOAA, 2015g) (NOAA, 2015h). Whereas the majority of New York falls into climate group (D), New York City and Long Island are in the (C) climate group. This climate generally has "warm and humid summers with mild winters" and in winter "the main weather feature is the mid-latitude cyclone" (NOAA, 2015g). Also, there are many thunderstorms during summer months. New York has three sub-climate categories, which are described in the following paragraphs (NWS, 2011a) (NWS, 2011b).

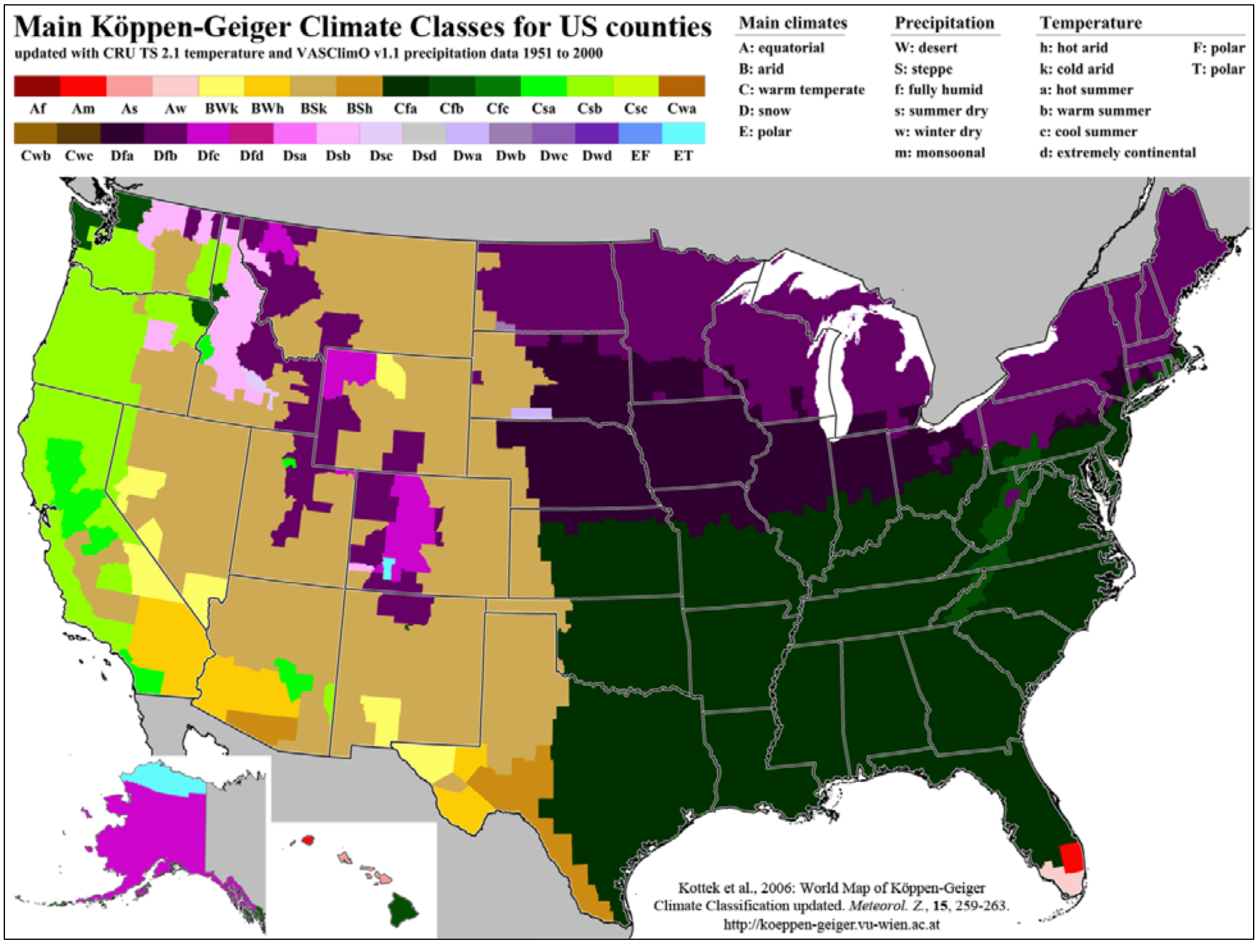

Figure 11.1.14-2: Köppen-Geiger Climate Classes for US Counties

Source: (Kottek, et al., 2006)

Sub-climates

Cfa – The Köppen-Geiger climate classification system classifies Manhattan and Long Island as Cfa. Cfa climates are generally warm, with humid summers and mild winters. New York's secondary classification indicates year-round rainfall, but it is highly variable; thunderstorms are dominant during summer months. The tertiary classification indicates mild, hot summers with average temperature of warm months over 72 °F. Average temperatures of the coldest months are under 64 °F (NWS, 2011a) (NWS, 2011b).

Dfa – The Köppen-Geiger climate classification system classifies portions of southern New York as Dfa. Climates classified as Dfa are characterized by warm and humid temperatures, with hot summers and regular precipitation all year (Figure 11.1.14-2). New York's Dfa climate group is a continental, mid-latitude climate. New York's secondary classification indicates substantial precipitation during all seasons. New York's tertiary classification indicates hot summer months, with warmer temperatures averaging above 71.6 °F (Kottek, et al., 2006) (NWS, 2011a) (NWS, 2011b).

Dfb **–** Portions of northern, eastern, and western New York, such as Rochester and areas around Lake Ontario, are classified as Dfb. Climates classified as Dfb are characterized as humid, with warm summers and snowy winters (Figure 11.1.14-2). New York's secondary classification indicates substantial precipitation during all seasons. New York's tertiary classification indicates that at least four months out of the year averaging above 50 °F (Kottek, et al., 2006) (NWS, 2011a) (NWS, 2011b).

11.1.14.5 Existing Climate

This section discusses the current state of New York's climate with regard to air temperature, precipitation, sea level, and extreme weather events (e.g., tropical storms, tropical cyclones, and hurricanes) in New York's three climate regions, Cfa, Dfa, and Dfb.

Air Temperature

The highest temperature to occur in New York was on July 22, 1926 with a record high of 108 °F (NOAA, 2015i). The coldest temperature to occur in New York was on February 18, 1979 with a record low of negative 52 °F (NOAA, 2015i). From late May to mid-September, temperatures of 90 °F or higher typically occur in most of the state. While temperatures above 100 °F are uncommon, they do occur in southern areas of the state. Extended periods of cold or warm weather in New York result from the movement of high-pressure air mass systems, influenced by latitudinal and topographical variations. Since 1901, the mean annual average temperature has increased by 4.4 °F (New York City Panel on Climate Change (NPCC2), 2013) (NOAA, 2015g) (NOAA, 2015h).

Cfa **–** New York City is located in southeastern New York, within the climate classification Cfa. The average annual mean temperature is approximately 55 °F in the New York City area. Long Island and New York City experience subzero temperatures in two or three winters out of ten, with the lowest temperature generally reaching negative five °F. The summer climate in the New York City and Hudson Valley areas is much warmer, with higher humidity levels than other more northern areas of the state (NWS, 2011a) (NWS, 2011b) (NOAA, 2015g) (NOAA, 2015h).

Dfa **–** Ulster, Dutchess, Orange, Putnam, Sullivan, Westchester, and Rockland County are located in southern New York, within the climate classification zone Dfa. The average annual mean temperature for this area is approximately 50 °F, while the coldest months can drop below negative 22 °F. Winters in Dfa climate areas are typically very cold, with "snowstorms, strong winds, and bitter cold from Continental Polar or Arctic air masses" (Kottek, et al., 2006) (NOAA, 2015g) (NOAA, 2015h).

Dfb **–** The Adirondacks are located in northern New York, within the climate classification Dfb. In the Adirondacks, the average annual mean temperature is approximately 40 °F. During winter months, temperatures of negative 25 °F or lower are common in the northern highlands, with temperatures around negative 15 °F or lower in the southwestern and east-central highlands. The summer climate is cool in the Adirondacks, Catskills, and other higher elevations of the state. Dfb climates in northern New York typically experience warm summers, with temperatures ranging between the upper 70s to the mid-80s (NOAA, 2015g) (NOAA, 2015h).

Precipitation

Topography within the state and proximity to the Great Lakes or Atlantic Ocean strongly influences the distribution of rainfall across New York (NCDC, 2015). Weather systems from the Gulf of Mexico, the Atlantic Ocean, and the Great Lakes are primarily responsible for transporting precipitation into New York through circulation patterns and storm systems (NCDC, 2015). Overall, New York has an even distribution of precipitation throughout the year, as there are no distinct wet or dry seasons (NCDC, 2015).

In addition to rainfall, New York commonly experiences abundant snowfall. On average, the state receives an annual amount of 40 inches or more, and 60 percent of New York receives more than 70 inches of snow per year on average (NCDC, 2015). For example, snowfalls of 175 inches per year occur in western and southwestern Adirondack areas and 150 to 180 inches on average fall in areas adjacent to Lake Erie (NCDC, 2015). Since 1901, the mean annual precipitation in New York has increased by 7.7 inches (a change of 1.4 percent per decade) (New York City Panel on Climate Change (NPCC2), 2013). Additionally, the year-to-year precipitation variability was greater between 1956 and 2011 than between 1900 to 1955 (New York City Panel on Climate Change (NPCC2), 2013) (NOAA, 2015g).

In addition to topographical variations, New York is also subject to the “Lake Effect,” which is described as “heavily localized snowfall” most commonly occurring from November through February (NOAA, 2015j). Within the band of clouds that form during Lake Effect events, snowfall rates can exceed “five inches an hour [and can] be accompanied by lightning and thunder, a phenomenon known as thundersnow” (NOAA, 2015j). In some cases, these bands of snow can result in rapid snowfall and accumulation, dropping several inches of snow in a short amount of time. For example, during, November 19 to 21, 2014, snowfall accumulation reached 49 inches at the Wales Center stations and 22.4 inches at the Highmarket station (48+/- hours of accumulation time) (NWS, 2014) (NCDC, 2015) (NOAA, 2015j).

Cfa **–** “Monthly accumulations between 3 and 10 inches” of snowfall typically occur within areas of New York City and Long Island (NCDC, 2015). Occasionally, monthly snowfall accumulations in Dfa climate zones may exceed 20 inches per month. The greatest annual snowfall accumulation in New York City occurred between 1995 and 1996, with a total accumulation of 75.6 inches (NOAA, 2015i). The lowest annual snowfall accumulation in New York City occurred between 1972 and 1973, with a total accumulation of 2.8 inches (NOAA, 2015i). The average annual snowfall in New York City (Central Park Station) is 25.1 inches (NOAA, 2015g) (NCDC, 2015).

Dfa **-** Ulster, Dutchess, Orange, Putnam, Sullivan, Westchester, and Rockland County are located in southern New York, within the climate classification zone Dfa. This area on average receives approximately 45 inches of precipitation annually. For example, Poughkeepsie (located in Dutchess County) receives an average of 46.3 inches of precipitation per year. Poughkeepsie receives on average 9.27 inches of precipitation during winter months; 13.28 inches during summer months, 11.76 inches during spring months; and 12.22 inches during autumn months (NWS, 2011a) (NWS, 2011b).

Dfb – The Adirondacks are located within the climate classification zone Dfb. Areas such as the western Adirondacks typically receive "average annual rainfall amounts in excess of 50 inches" (NCDC, 2015). Areas with less annual rainfall (average of 30 – 33 annual inches per year), occur near Lake Ontario (NCDC, 2015).

Sea Level

New York has approximately 1,850 miles of developed and densely populated tidal shoreline, and more than half of New York's inhabitants live on or in close proximity to coastal and tidal shorelines (NYSDEC, 2015cd) (New York City Panel on Climate Change (NPCC2), 2013). Much of this shoreline is at risk for damage from strong winds, heavy rainfall, flooding, and hurricanes. Since 1900, sea level in New York City (at the Battery) has risen approximately 1.1 feet, mostly due to thermal expansion (New York City Panel on Climate Change (NPCC2), 2013). As sea level continues to rise, the risks associated with living along the coast also rise. Hurricane Sandy in 2012 highlighted the risks and vulnerabilities of living near unprotected tidal shoreline. In addition to sea level rise, coastal and tidal areas of New York are experiencing land subsidence. Further land subsidence is putting already low-lying areas of New York at an even greater risk for flooding, storm surges, and inundation (NYSDEC, 2015cd).

Severe Weather Events

In New York, the most common forms of severe weather include severe flooding, heavy winds, hurricanes, and ice storms. In New York, high intensity thunderstorms are the most common cause of flash flooding. New York is also directly adjacent to the Atlantic Ocean, which makes the state highly vulnerable to coastal storms and tidal flooding. Additionally, New York is susceptible to riverine flooding, which can occur due to excessive or rapid snowmelt, ice floes, and heavy rainfall. One of the most costly, widespread, and damaging floods to occur was in June 1972. This historic flood occurred due to a combination of precipitation from Hurricane Agnes and another large low-pressure system. One of the most costly, widespread, and damaging floods to occur was in June 1972 (NWS 2015a). In August 2014, a state 24-hour precipitation record was set, with a total rainfall accumulation of 13.57 inches. This historic rainfall event resulted in highly destructive flash flooding throughout most of Long Island (NWS 2015b) (NCDC, 2015) (NYOEM, 2015a) (NOAA, 2015k).

Heavy winds originating in western New York can also contribute to property loss and damage. Thunderstorms occur approximately 30 days out of an average year (NCDC, 2015). During the summer, a combination of high winds, lightning, and hail can lead to even more harmful weather events; tornadoes are not common (NCDC, 2015). During winter months, ice storms and freezing rain in New York are very common. Ice storms damage many highways, sidewalks, utility lines, transmission towers, trees, and other surfaces in the state each year (NCDC, 2015).

Hurricanes occur in New York with relatively frequency, with at least one major hurricane occurring approximately each decade. In 1938, a category three hurricane made landfall in New York, crossing through Long Island and into parts of New England. The hurricane killed 200 people, with 10 deaths occurring in New York. In 1960, Hurricane Donna caused an 11-foot storm surge in New York Harbor, resulting in significant damage to coastal infrastructure. In

1972, Tropical Storm Agnes caused 122 deaths and more than $6 billion in damages along the East Coast from North Carolina to New York. According to many hurricane experts, warmer waters in the Atlantic Ocean and Gulf of Mexico are contributing to more frequent and damaging hurricanes than in previous decades, with a record of 15 hurricanes occurring from the North Atlantic in 2005. In August of 2011, New York issued its first mandatory evacuation of coastal areas, and evacuated 375,000 residents in preparation for Hurricane Irene, a tropical storm that caused more than $100 million in damages. In October 2012, Hurricane Sandy made landfall in New York City. In preparation for this hurricane, the state once again issued a mandatory evacuation for coastal areas. Winds during Hurricane Sandy reached up to 85 miles per hour (mph), with a peak storm surge of 9.41 feet (NYOEM, 2015b).

The following paragraphs describe severe weather events as they occur in the various climate classification zones:

Cfa – The majority of storm systems that move eastward across North America pass through or in close proximity to New York. These storm systems routinely influence the climates of Long Island and the lower Hudson Valley (NCDC, 2015).

Dfa – In addition to other coastal storm vulnerabilities, areas of New York classified as a Dfa climate are subject to severe summertime thunderstorms. New York has a "moderate occurrence of lightning, with 3.8 strikes occurring per square mile each year" (NYOEM, 2015c).

Dfb – Areas of New York classified as a Dfb climate are subject to extensive hurricane damage and associated flooding. Although it is uncommon for hurricanes to travel inshore once they make landfall, storms can re-intensify if they come into contact and combine with pre-existing low-pressure storms (Ho, Su, Hanevich, Smith, & Richards, 1987). As was observed during Hurricane Sandy, inland properties and structures may be more vulnerable to hurricanes and inland flooding than those in coastal areas may, as building codes are much less strict (NOAA, 2004).

11.1.15 Human Health and Safety

11.1.15.1 Definition of the Resource

The existing environment for health and safety is defined by occupational and environmental hazards likely to be encountered during the construction, operation, and maintenance of towers, antennas, cables, utilities, and other equipment and infrastructure at existing and potential FirstNet telecommunication sites. There are two human populations of interest within the existing environment of health and safety, (1) telecommunication occupational workers and (2) the general public near telecommunication sites. Each of these populations could experience different degrees of exposure to hazards as a result of their relative access to FirstNet telecommunication sites and their function throughout the implementation of the FirstNet telecommunication network infrastructure.

The health and safety issues reviewed in this section include occupational safety for telecommunications workers, contaminated sites, and manmade or natural disaster sites. This section does not evaluate the health and safety risks associated with radio frequency (RF) radiation or vehicular traffic. Vehicle traffic is evaluated in Section 11.1.1, Infrastructure.

11.1.15.2 Specific Regulatory Considerations

Federal organizations, such as the Occupational Safety and Health Administration (OSHA), USEPA, the U.S. Department of Health and Human Services, and others protect human health and the environment. In New York, occupational safety is regulated by the New York State Department of Labor, Division of Safety and Health (NYDOSH), and NYSDEC regulates environmental pollution. Federal OSH regulations apply to workers through either OSHA or stricter state-specific plans that must be approved by OSHA. New York has an OSHA-approved "State Plan," which covers state and local government workplaces. NYDOSH has adopted all OSHA standards, but has unique regulations for the recording and reporting of occupational injuries and illnesses (OSHA, 2016a). Private sector occupational safety and health regulations are enforced at the federal level by OSHA. Public health is regulated by the New York State Department of Health (NYSDOH).

Federal laws relevant to protect occupational and public health and safety are summarized in Appendix C. Table 11.1.15-1 summarizes the major New York laws relevant to the state's occupational health and safety, hazardous materials, and hazardous waste management programs.

Table 11.1.15-1: New York Human Health and Safety Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
New York Code, Rules and Regulations (NYCRR): Title 12, Part 59, Workplace Safety and Loss Prevention Program	New York State Department of Labor (NYSDOL); Worker Protection Bureau; Division of Safety and Health	Requires employers with an annual payroll of over $800,000 and a workers' compensation experience modification rating of more than 1.20 to participate in New York's Workplace Safety and Loss Prevention Program (WSLPP). Specifies the required responsibilities of employers and workplace safety and loss prevention consultants, including record keeping.
NYCRR: Title 12, Part 60, Workplace Safety and Loss Prevention Incentive Program	NYSDOL; Worker Protection Bureau; Division of Safety and Health	Specifies the requirements for voluntary participation in a Workplace Safety and Loss Prevention Incentive Program (WSLPIP) that must be followed in order for an employer to receive NYSDOL approval. Eligible programs include a safety program, drug and alcohol prevention program, and a return to work program.
NYCRR: Title 12, Part 800.7, Emergency Escape and Self Rescue Ropes and System Components for Firefighters	NYSDOL; Worker Protection Bureau; Division of Safety and Health	Specifies requirements for employers who employ firefighters to develop a written hazard assessment of the surrounding area, including types and heights of buildings and other structures in the area (excludes employers located in a city with a population of over 1 million). Additionally, the Code Rule outlines requirements for firefighter training and safety, including self-rescue ropes and system components.
NYCRR: Title 12, Part 801	NYSDOL; Worker Protection Bureau; Division of Safety and Health	Specifies requirements for the recordkeeping and reporting of public employees' occupational injuries and illnesses in accordance with the New York Public Employee Safety and Health Act (Labor Law, Section 27-a).
NYCRR: Title 6, Part 360, Materials Management Program	NYSDEC Office of Remediation and Materials Management; Division of Materials Management	Provides general operational requirements for all solid waste management facilities, and provides technical and regulatory assistance to the 9 multi-county regional offices regarding pesticides, used oil, medical waste, and other select waste.
NYCRR: Title 16	New York Division of Homeland Security & Emergency Services (NYSDHSES); Public Service Commission	Contains requirements for operation and maintenance of utilities in terms of occupational and public health and safety, including reporting requirements for accidents and leaks which can be detrimental to public safety, or when hazardous conditions are observed. Additionally, Part 105 contains requirements for electric utility emergency plans and outage restoration performance reports, intended to ensure adequate utility response for storm and storm-like emergencies.

11.1.15.3 Environmental Setting: Existing Telecommunication Sites

There are many inherent health and safety hazards at telecommunication sites. Telecommunication site work is performed indoors, below ground level, on building roofs, over waterbodies, and on communication towers. Tasks may also be performed at dangerous heights and possibly in confined spaces, while operating heavy equipment, on energized equipment near underground and overhead utilities, and while using hazardous materials, such as flammable gases and liquids. Because telecommunication workers are often required to perform work outside, heat and cold exposure, precipitation, and lightning strikes also present hazard and risks depending on the task, occupational competency, and work-site monitoring (OSHA, 2016b). A summary description of the health and safety hazards present in the telecommunication occupational work environment is listed below.

Working from height, overhead work, and slip, trips, and falls – At tower and building-mount sites, workers regularly climb structures using fixed ladders or step bolts to heights up to 2,000 feet above the ground's surface (OSHA, 2015a). In addition to tower climbing hazards, telecommunication workers have restricted workspace on rooftops or work from bucket trucks parked on uneven ground. Cumulatively, these conditions present fall and injury hazards to telecommunication workers, as well as to the general public who may be observing the work or transiting the area. (International Finance Corporation, 2007)

Trenches and confined spaces – In rare cases, FirstNet deployment, operation, and maintenance activities may involve work in trenches or confined spaces. Installation and maintenance of underground utilities in urban areas or manholes180 are examples of when confined space work is necessary. Installation of telecommunication activities involves laying conduit and in small trenches (generally 6 to 12 inches in width). Confined space work can involve poor atmospheric conditions, requiring ventilation and rescue equipment. Additionally, when inside a confined space, worker movement is restricted and may prevent a rapid escape or interfere with proper work posture and ergonomics. (OSHA, 2016c)

Heavy equipment and machinery – New and replacement facility construction and maintenance can involve the use of heavy equipment and machinery. During the lifecycle of a telecommunication site, heavy equipment such as bulldozers, backhoes, dump trucks, cement trucks, and cranes are used to prepare the ground, transport materials and soil, and raise large sections of towers and antennas. Telecommunication workers may be exposed to the additional site traffic and often work near heavy equipment to direct the equipment drivers and to accomplish work objectives. Accessory machinery such as motorized pulley systems, hydraulic metal shears, and air driven tools present additional health and safety risks as telecommunication work sites. These pieces of machinery can potentially sever skin and bone, or cause other significant musculoskeletal injuries to the operator. (OSHA, 2016c)

Energized equipment and existing utilities – Electrical shock from energized equipment and utilities is an elevated risk at telecommunication sites due to the amount of electrical energy required for powering communication equipment and broadcasting towers. Telecommunication cables are often co-located with underground and overhead utilities, which can further increase occupational risk during earth-breaking and aerial work. (International Finance Corporation, 2007)

Optical fiber safety – Optical fiber cable installation and repair presents additional risks to telecommunications workers, including potential eye or tissue damage, through ingestion, inhalation, or other contact with glass fiber shards. The shards are generated during termination and splicing activities, and can penetrate exposed skin. (International Finance Corporation, 2007) Additionally, fusion splicing (to join optical fibers) in confined spaces or other

[180] Manholes may be used for telecommunications activities, especially in cities and urban areas, depending on the location of other utilities. In cities, power, water, and telecommunication lines are often co-located; if access is through a manhole in the street, that access will be used.

environments with the potential for flammable gas accumulation presents risk of fire or explosion (Fiber Optic Association, 2010).

Noise – Sources of excess noise at telecommunication sites include heavy equipment operation, electrical power generators and other small engine equipment, air compressors, electrical and pneumatic power tools, and road vehicles, such a diesel engine work trucks. The cumulative noise environment has the potential to exceed the OSHA acceptable level of 85 decibels (dB) per 8-hour time weighted average (TWA) (see Section 11.1.13, Noise) (OSHA, 2002). Fugitive noise may emanate beyond the telecommunication work site and impact the public living in the vicinity, observing the work, or transiting through the area. (OSHA, 2016c)

Hazardous materials and hazardous waste – Work at telecommunication sites may require the storage and use of hazardous materials such as fuel sources for backup power generators and, compressed gases used for welding and metal cutting (new towers only). In some cases, telecommunication sites require use of potentially hazardous products (e.g., herbicides). Secondary hazardous materials, like exhaust fumes, may be a greater health risk than the primary hazardous material (e.g., diesel fuel). Furthermore, the use of hazardous materials creates down-stream potential to generate hazardous waste. Hazardous waste is likely to be stored properly in containers onsite, whereas less obvious hazardous materials might also be present, such as lead-based paint on old tower equipment and asbestos tiles and insulation in equipment sheds. While it is unlikely that any FirstNet activities would involve the generation or storage of hazardous waste, older existing telecommunication structures and sites could have hazardous materials present, such as lead-based paint (exterior and interior) at outdoor structures or asbestos tiles and insulation in equipment sheds. The general public, unless a telecommunication work site allows unrestricted access, are typically shielded from hazardous materials and hazardous wastes that are components of telecommunication site work. (OSHA, 2016c)

Aquatic environments – Installation of telecommunication lines may include laying, burying, or boring lines under waterways and wetlands, such as lakes, rivers, ponds, or streams. Workers responsible for these activities operate heavy equipment from soft shorelines, boats, barges, and other unstable surfaces. There is potential for equipment and personnel falls, as well as drowning in waterbodies. Wet work conditions also increase risks of electric shock and hypothermia. (OSHA, 2016c)

Outdoor elements – Weather conditions have the potential to quickly and drastically reduce safety, and increase hazards at telecommunication work sites. Excessive heat and cold conditions impact judgement, motor skills, hydration, and in extreme cases may lead to hyper- or hypothermia. Precipitation, such as rain, ice, and snow, create slippery climbing conditions and wet or muddy ground conditions. Lightning strikes are risks to telecommunication workers climbing towers or working on top of buildings. (OSHA, 2016c)

Telecommunication Worker Occupational Health and Safety

The U.S. Department of Labor, BLS uses established industry and occupational codes to classify telecommunications workers. For industry classifications, BLS uses the North American Industry Classification System (NAICS) codes, which identify the telecommunications industry

(NAICS code 517XX) as being within the information industry (NAICS code 51). For occupational classifications, BLS uses the Standard Occupational Classification (SOC) system to ifdentify workers as belonging to 1 of 840 occupations. Telecommunications occupations are identified as either telecommunication equipment installers and repairers, except line installers (SOC code 49-2022), or telecommunication line installers and repairers (SOC code 49-9052). Both occupations are reported under the installation, maintenance and repair occupations (SOC code 49-0000).

As of May 2014, there were more telecommunication line installation and repair workers (13,490 employees) working in New York than any other state (BLS, 2015d). That same year, there were 14,270 telecommunication equipment installers and repairers (Figure 11.1.15-1) working in the state (BLS, 2015e). In 2013, New York reported 3.2 nonfatal occupational injuries and illnesses in the telecommunications industry per 100 full-time workers (BLS, 2015f). By comparison, there were 2.1 nonfatal occupational injuries and illnesses reported nationwide per 100 full-time workers in the telecommunications industry (BLS, 2014a). Nationwide in 2013, there were 18 fatalities reported across the telecommunications industry (5 due to violence and other injuries by persons or animals; 3 due to transportation incidents; and 7 due to slips, trips, or falls; and 3 due to unknown causes), with an hours-based fatal injury rate of 7.9 per 100,000 full-time equivalent workers (BLS, 2013). This represents 45 percent of the broader information industry fatalities (40 total), and less than 1 percent of total occupational fatalities (4,585 total). New York has not reported fatalities in the telecommunications industry since 2012, in which there were three total (BLS, 2015g).

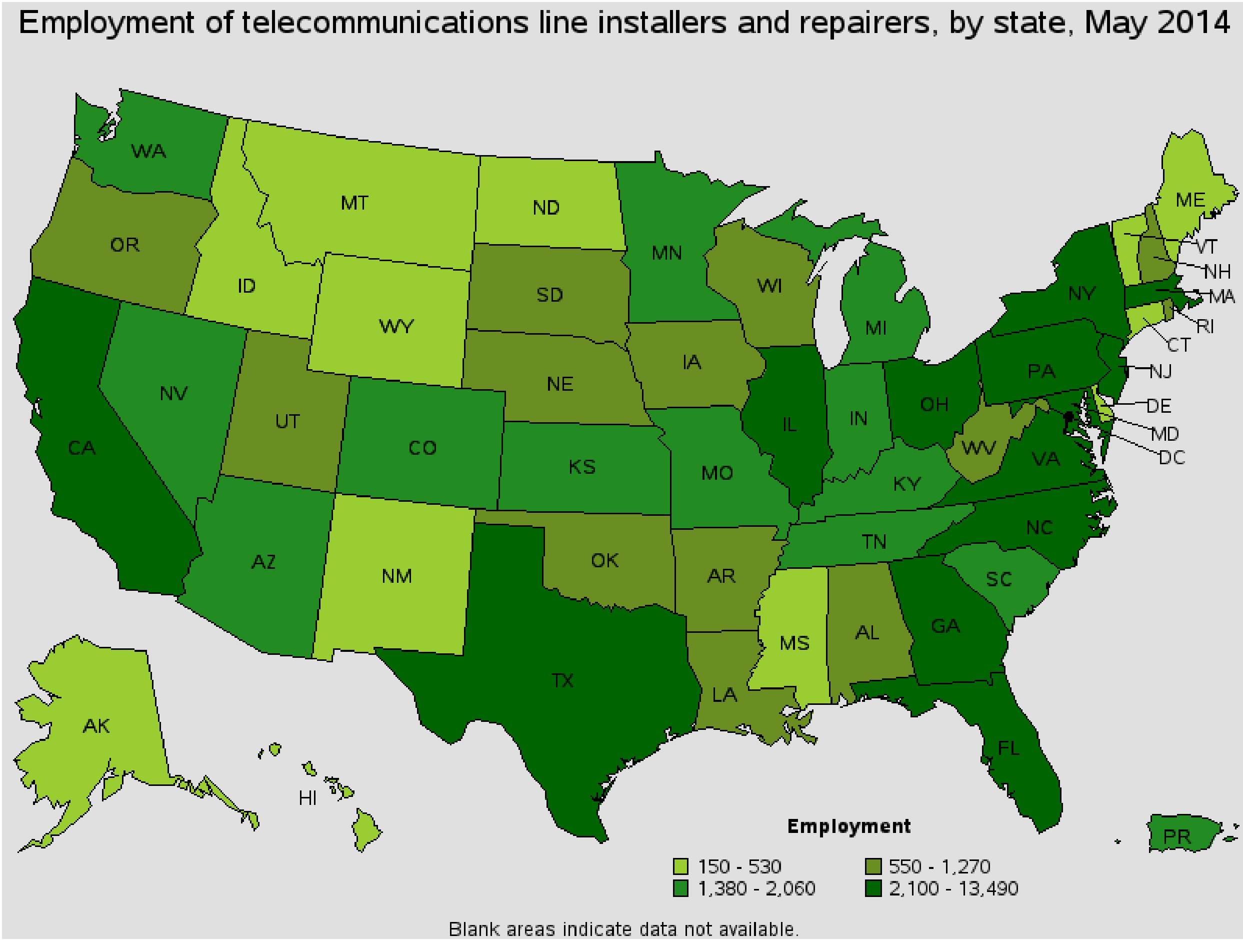

Figure 11.1.15-1: Number of Telecommunication Line Installers and Repairers Employed per State, May 2014

Source: (BLS, 2015h)

Public Health and Safety

The general public is unlikely to encounter occupational hazards at telecommunication sites, due to limited access. Environmental and public health data are reported at the federal level through the Center for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (WONDER). While the WONDER database cannot be searched for cases specific to telecommunication sites, many available injury categories are consistent with risks present at telecommunication sites. For example, in New York, between 1999 and 2014, there were 409 fatalities due to a fall from, out of, or through a building or structure; 62 fatalities due to being caught, crushed, jammed or pinched in or between objects; and 42 fatalities due to exposure to electric transmission lines (Center for Disease Control and Prevention, 2016). Among the general public, trespassers entering telecommunication sites would be that the greatest risk for exposure to health and safety hazards.

11.1.15.4 Environmental Setting: Contaminated Properties at or near Telecommunication Sites

Existing and surrounding land uses, including landfills or redeveloped brownfields, near telecommunication sites have the potential to impact human health and safety. Furthermore, undocumented environmental practices of site occupants at telecommunication sites, prior to creation of environmental laws, could result in environmental contamination, affecting the quality of soil, sediments, groundwater, surface water, and air.

Contaminated property is typically classified by the federal environmental remediation or cleanup programs that govern them, such as sites administered through the Superfund Program[181] or listed on the National Priorities List (NPL), as well as the Resource Conservation and Recovery Act (RCRA) Corrective Action sites and Brownfields. These regulated cleanup sites are known to contain environmental contaminants at concentrations exceeding acceptable human health exposure thresholds. Contact with high concentrations of contaminated media can result in adverse health effects, such as dermatitis, pulmonary and cardiovascular events, organ disease, central nervous system disruption, birth defects, and cancer. It generally requires extended periods of exposure over a lifetime for the most severe health effects to occur.

In New York, the NYSDEC uses the Inactive Hazardous Waste Disposal Site (IHWDS) Program to identify, investigate, and cleanup sites where significant amounts of hazardous waste may exist. Registered IHWDS sites receive a Classification Code of 1 through 5 depending on the level of contamination and threat to public health or the environment. Class 1 and Class 2 IHWDSs present an imminent danger or a significant threat, respectively, to public health or the environment (NYSDEC, 2015ce). According to New York's Environmental Remediation Database in July 2015, New York has no sites with a Classification Code of 1, and 446 sites with a classification code of 2; 70 of these sites are located in Nassau County (more than double the number of sites in any other county) (NYSDEC, 2015cf). As of August 2015, New York had 165 RCRA Corrective Action sites[182] and 570 brownfield sites, and 87 proposed or final Superfund/NPL sites (USEPA, 2015af). Based on a July 2015 search of USEPA's Cleanups in My Community (CIMC) database, there are two Superfund sites in New York where contamination has been detected at an unsafe level, or a reasonable human exposure risk exists (Hudson River PCBs in Warren County and Onondaga Lake in Onondaga County) (USEPA, 2015ag). Brownfield sites in New York may be enrolled in a variety of programs managed by the NYSDEC, Office of Brownfield Reuse, including the Brownfield Cleanup Program and Environmental Restoration Program (NYSDEC, 2016a). One example of a brownfield site is the Tecumseh Business Park, south of Buffalo, NY. The 1,100-acre site was formerly used for steel and coke production until operations ceased in 2000. Through a Memorandum of Understanding

[181] The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) enacted in 1980, commonly referred to as the Superfund Program, governs abandoned hazardous waste sites, and collects a tax on chemical and petroleum industries. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986; see Appendix A, Environmental Laws and Regulations. (USEPA, 2011a)

[182] Data gathered using USEPA's Cleanups in My Community (CIMC) search on July 21, 2015, for all sites in New York State, where cleanup type equals 'RCRA Hazardous Waste – Corrective Action,' and excludes sites where cleanup phase equals 'Construction Complete' (i.e., no longer active). (USEPA, 2015af)

with Erie County and the City of Lackawanna, a portion of the site was redeveloped in 2006 into a wind turbine farm, producing 20 megawatts of clean energy. (NYSDEC, 2016b)

In addition to contaminated properties, certain industrial facilities are permitted to actively release toxic chemicals into the air, water, or land. One such program is the Toxics Release Inventory (TRI), administered by the USEPA under the Emergency Planning and Community Right to Know Act (EPCRA) of 1986. The Toxic Release Inventory database is a measure of the industrial nature of an area and the over-all chemical use, and can be used to track trends in releases over time. The "releases" do not necessarily equate to chemical exposure by humans or necessarily constitute to quantifiable health risks because the releases include all wastes generated by a facility – the majority of which are disposed of via managed, regulated processes that minimize human exposure and related health risks (e.g., in properly permitted landfills or through recycling facilities). As of August 2015, New York has 628 TRI reporting facilities according to the NIH TOXMAP database (National Institute of Health, 2015a). According to the USEPA, New York generated a total of 16,783,980 pounds of onsite and offsite disposal or other TRI releases in 2013, largely from the chemical manufacturing industry. This accounted for 0.40 percent of total nationwide TRI releases, ranking New York 39 out of 56 states and territories (USEPA, 2014f).

Another USEPA program is the National Pollutant Discharge Elimination System (NPDES), which regulates the quality of stormwater and sewer discharge from industrial and manufacturing facilities. Permitted discharge facilities are potential sources of toxic constituents that are harmful to human health or the environment. As of February 23, 2016, New York had 350 permitted major discharge facilities registered with the USEPA Integrated Compliance Information System (USEPA, 2016a).

The NIH, U.S. National Library of Medicine, provides an online mapping tool called TOXMAP, which allows users to "visually explore data from USEPA's TRI and Superfund Program" (NIH, 2015). Figure 11.1.15-2 provides an overview of potentially hazardous sites in New York.

Another health and safety hazard in New York includes surface and subterranean mines. Health and safety hazards at active mines and abandoned mine lands (AML) include falling into open shafts, cave-ins from unstable rock and decayed support, deadly gases and lack of oxygen inside the mine, unused explosives and toxic chemicals, horizontal and vertical openings, high walls, and open pits (FAA, 2015a). Gradual settling or sudden sinking of the Earth's surface, also known as subsidence, presents additional risks and is further discussed in Section 11.1.3, Geology.

In 2015, the New York mining industry ranked 19th for non-fuel minerals (primarily salt, crushed stone, sand and gravel, portland cement, and wollastonite), generating a value of $1.53B (USGS, 2016b). Except for the New York City metro area, mining activities occur in nearly every county in the state, and the majority of mines (as much as 90 percent), are open-pit sand, and gravel mines (NYSDEC, 2013c). Other than sand and gravel resources found throughout the state, metal ore and gem mines are found in New York's mountain regions, and

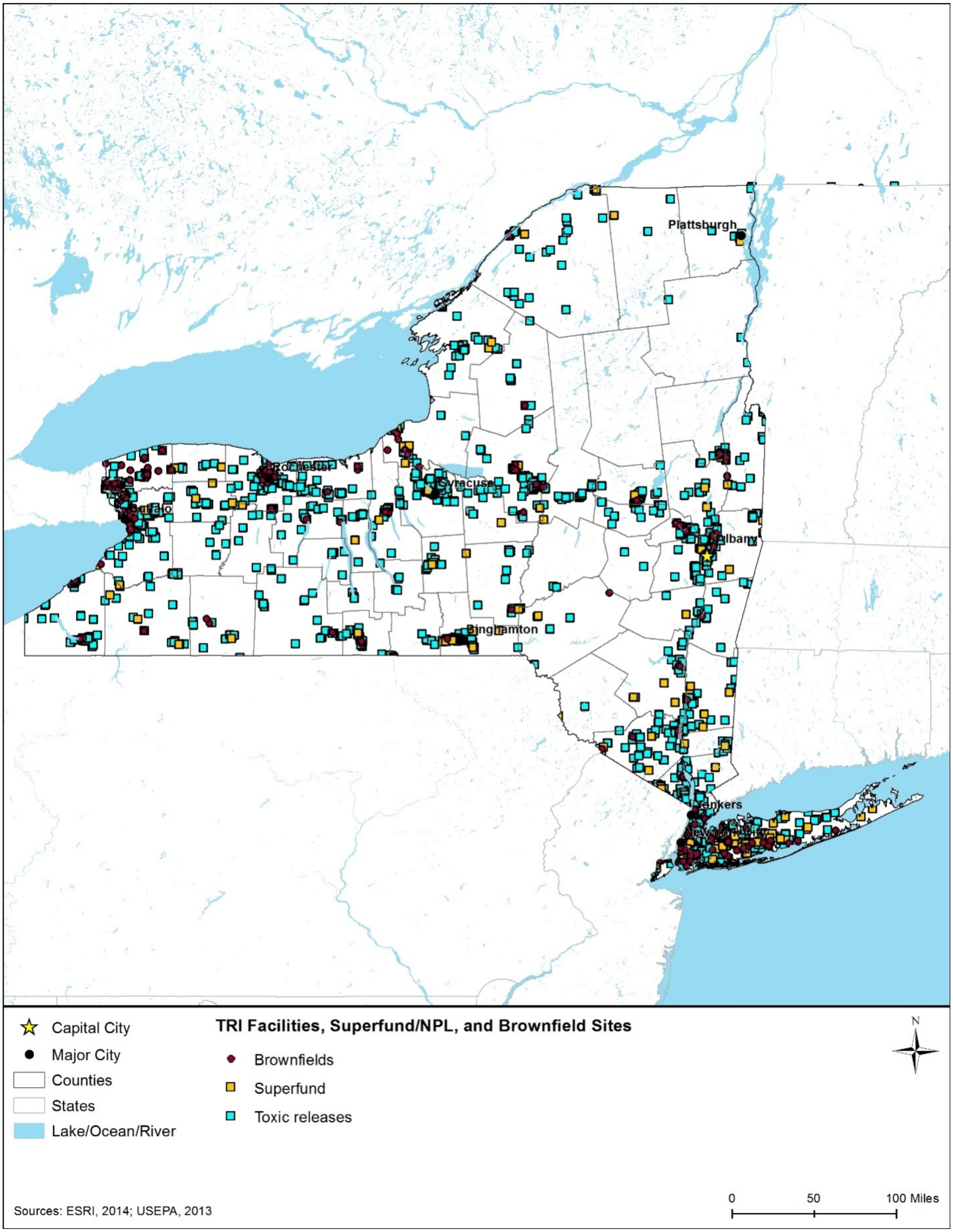

Figure 11.1.15-2: TOXMAP Superfund/NPL and TRI Facilities in New York (2013)

salt mines are found in the central portion of the state. Since the enactment of the mined land reclamation law in 1975, some 4,800 mines have received state permits (NYSDEC, 2013b). As of February 2016, there were no high priority AMLs (sites posing health and safety hazards) in New York (U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, 2016), therefore hazards relating to mines are not discussed further.

Telecommunication Worker Occupational Health and Safety

Telecommunications sites may be on or near contaminated land, industrial discharge facilities, or mines. Occupational exposure to contaminated environmental media can occur during activities like soil excavating, trenching, other earthwork, and working over waterbodies. Indoor air quality may also be impacted from vapor intrusion infiltrating indoors from contaminated soil or groundwater that are present beneath a building's foundation. As of February 2016, there are 61 USEPA-regulated telecommunications sites in New York (USEPA, 2016b). These sites are regulated under one or more environmental programs including NPDES compliance, Superfund/NPL status, and TRI releases.

According to BLS data, New York had five occupational fatalities in 2013 and 4 fatalities in 2004 within the installation, maintenance, and repair occupations (SOC code 49-0000) from occupational exposure to "harmful substances or environments," although these were not specific to telecommunications (BLS, 2015g). By comparison, BLS reported three fatalities in 2011 and three preliminary fatalities[183] in 2014 nationwide within the telecommunications industry (NAICS code 517), due to exposure to harmful substances or environments (BLS, 2015g). In 2014, BLS also reported four preliminary fatalities within the telecommunications line installers and repairers occupation (SOC code 49-9052), and no fatalities within the telecommunications equipment installers and repairers occupation (SOC code 49-2022) due to exposure to harmful substances or environments (BLS, 2014b).

Public Health and Safety

As described earlier, access to telecommunication sites is nearly always restricted to occupational workers. Although site access control is one of the major reasons telecommunication sites present an inherent low risk to non-occupational workers, the general public could be potentially exposed to contaminants and other hazards in a variety of ways. One example would be if occupational workers disturb contaminated soil while digging, causing hazardous chemicals to mix with an underlying groundwater drinking water sources. If a contaminant enters a drinking water source, the surrounding community would then inadvertently ingest or absorb the contaminant when using that source of water for drinking, cooking, bathing, and swimming. By trespassing on a restricted property, a trespasser may come in contact with contaminated soil or surface water, or by inhaling harmful vapors. The NYSDOH Division of Environmental Health Assessment (DEHA) is responsible for collecting public health data resulting from exposure to environmental contamination (NYSDOH, 2015b). Data regarding public illnesses or fatalities associated with exposure to environmental

[183] BLS Census of Fatal Occupational Injuries data for 2014 is for preliminary reporting only. Final data are expected to be released in spring 2016. (BLS, 2015i)

Spotlight on New York Superfund Sites: Love Canal

Love Canal was a 16-acre landfill in the southeast corner of Niagara Falls, NY (Figure 11.1.15-3), originally excavated in the 1890s as a canal for a proposed hydroelectric power plant. The project was never completed, and was sold at auction in 1920 for use as a chemical disposal site until 1953. Between 1942 and 1952, Hooker Electrochemical disposed of over 21,000 tons of various chemical wastes. The closed site was covered and redeveloped into a residential area and elementary school in 1954 (USEPA, 2012f).

Between 1975-1976, heavy rain and snowfall caused the groundwater to rise, bringing contaminated water to the surface, and forcing the evacuation of "950 families from a 10-square block area surrounding the landfill." (USEPA, 2012f). Love Canal became a declared State of Emergency in 1978, and ultimately led to the passage of CERCLA in 1980, commonly referred to as the Superfund Program, to govern abandoned hazardous waste sites and manage the cleanup of listed sites and assisting with environmental emergencies.

Figure 11.1.15-3: Photo of Love Canal Cleanup

Source: (USEPA, 2012g)

A 2008 study by the NYSDOH evaluated 6,026 Love Canal area residents and found elevated mortality rates for specific causes of death, including chronic rheumatic heart disease (men), and acute myocardial infarction (both sexes). Increased reproductive malformation was also observed, specifically for children born to Love Canal residents. Occupational exposure to chlorinated benzenes and aniline compounds, similar to those found at Love Canal, has been reported to cause increased risk of lung, kidney, and bladder cancer. (NYSDOH, 2008)

contamination is publicly available online using the state-managed DEHA or federally managed Center for Disease Control Environmental Public Health Tracker (NYSDOH, 2015c).

11.1.15.5 Environmental Setting: Natural and Manmade Disaster Sites

Natural and manmade disaster events can create health and safety risks, as well as present unique hazards, to telecommunication workers and the general public. Telecommunications, including public safety communications, can be unavailable (temporarily or permanently) during disaster events. Examples of manmade disasters are train derailments, refinery fires, or other incident involving the release of hazardous constituents. A common example of a natural disaster is flooding. Floodwaters damage transportation infrastructure (roads, railways, etc.) and utility lines (sewer, water, electric power, broadband, natural gas lines, etc.). Floodwaters are often contaminated by hazardous chemicals and sanitary wastes, which can cause headaches, skin rashes, dizziness, nausea, excitability, weakness, fatigue, and disease to exposed workers (OSHA, 2003).

Physical hazards may also be present at disaster sites, such as downed utility lines, debris blockage or road washout conditions, which increases exposure risks to telecommunication workers. Climbing and working from tower structures damaged by wind increases the risk of slips, trips, and falls. During natural and manmade disasters, access to the telecommunication sites can be littered with debris.

Spotlight on New York Natural Disaster Sites: Hurricane Sandy

Hurricane Sandy created widespread damage to the coastal region of New York in October 2012. The high winds and a 14-foot storm surge damaged coastal telecommunications infrastructure in the New York City metropolitan area and coastal areas. Many cell towers in the area did not have backup power, and shut down when electric service was down, leaving large sections of New York City's five boroughs without communications for several days. In response, telecommunication workers deployed cell on wheels (COWs), cells on light trucks (COLTs), and charging stations near community centers (Figure 11.1.15-4). New York City's Hurricane Sandy After Action Report recommended extending backup power capabilities at cell sites in flood-prone areas (New York City, 2013).

Figure 11.1.15-4: Photo of Temporary Cell Tower Being Setup Following Hurricane Sandy

Source: (Eli Wohl-VINnews.com, 2012)

Telecommunication Worker Occupational Health and Safety

Telecommunication workers are often called upon to provide support to natural and manmade disaster response efforts because of the critical need to restore and maintain telecommunication capabilities. The need to enter disaster areas as part of the initial recovery effort exposes telecommunication workers to elevated risks because chemical, biological, and physical hazards have not been fully assessed or cleared prior to telecommunication workers entering an area to complete repairs. Transportation infrastructure and utilities in the affected areas are often compromised and present unknown chemical and biologic hazards. Correspondingly, if telecommunication workers are injured during response operations that might be depending on damaged medical infrastructure and over-extended staff who are delivering care to victims of the initial incident.

Currently, the NYSDOL and BLS do not report data specific to injuries or fatalities among telecommunication workers responding to natural or manmade disasters. However, the National Response Center (NRC), managed by the U.S. Coast Guard, compiles reports for oil spills, chemical releases, or other maritime security incidents and contains incident reports related to occupational health and safety. Of the 709 NRC-reported incidents for New York in 2015 with known causes, 23 incidents attributed to natural disaster (e.g., flood, earthquake, or other natural phenomenon), and 686 incidents were attributed to manmade disaster (e.g., dumping, equipment failure, operator error, and over pressuring). For example, in New York, NY, on October 3, 2015, a manhole structure containing electrical cables leaked two gallons of di-electric fluid into a sewer drain due to equipment failure, requiring sampling for PCB analysis (U.S. Coast Guard, 2016). Such incidents present unique, hazardous challenges to telecommunication workers responding during natural or manmade disasters.

Public Health and Safety

Hazards present during natural and manmade disasters are often ubiquitous, affecting large geographic areas and affecting all populations living within the areas. Similar to telecommunication workers, the general public faces risks during these types of disasters, such as compromised transportation infrastructure and utilities, and potential for exposure to unknown chemical and biologic hazards. In 2014, New York experienced eight weather related fatalities and 374 injuries (NWS, 2015c). For comparison, in 2012, the year Hurricane Sandy impacted New York, there were 59 weather related deaths, and 19 weather related injuries (NWS, 2013). Manmade disasters, such as the September 11th terrorist attacks in New York City, can present unexpected and enduring health dangers to the public. For example, first responders, residents, and employees near the World Trade Center at the time of the attacks experienced (and some continue to experience) breathing and asthma-related concerns, nausea, headaches, and a variety of irritations (eyes, nose, throat, and skin) as a result of the dust cloud that damaged or covered their homes (New York City Department of Health and Mental Hygiene, 2015).

11.2 ENVIRONMENTAL CONSEQUENCES

This section describes the potential environmental impacts, beneficial, or adverse, resulting from the Proposed Action and Alternatives. As this is a programmatic evaluation, site- and project-specific issues are not assessed. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Each resource area identifies the range of possible impacts on resources for the Proposed Action and Alternatives, include the No Action Alternative. The No Action provides a comparison to describe the effects of environmental resources of the existing conditions to the proposed Alternatives.

NEPA requires agencies to assess the potential direct and indirect impacts each alternative could have on the existing environment (as characterized earlier in this section). Direct impacts are those impacts that are caused by the Proposed Action and occur at the same time and place, such as soil disturbance. Indirect impacts are those impacts related to the Proposed Action but result from an intermediate step or process, such as changes in surface water quality because of soil erosion.

For each resource, the potential impact is assessed in terms of context of the action and the intensity of the potential impact, per CEQ regulations (40 CFR §1508.27). Context refers to the timing, duration, and where the impact could potentially occur (i.e., local vs. national; pristine vs. disturbed; common species vs. protected species). In terms of duration of potential impact, context is described as short or long term. Intensity refers to the magnitude or severity of the effect as either beneficial or adverse. Resource-specific significance rating criteria are provided at the beginning of each resource area section.

11.2.1 Infrastructure

11.2.1.1 Introduction

This section describes potential impacts to infrastructure in New York associated with construction, deployment, and operation of the Proposed Action and Alternatives. See Chapter 17, Best Management Practices (BMP) and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.1.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on infrastructure were evaluated using the significance criteria presented in Table 11.2.1-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to infrastructure addressed in this section are presented as a range of possible impacts.

11.2.1.3 Description of Environmental Concerns

Transportation System Capacity and Safety

The primary concerns for transportation system capacity and safety related to FirstNet activities would primarily occur during the deployment phases of specific projects. Depending on the exact site locations and placement of new assets in the field, temporary impacts on traffic congestion, railway use, airport or harbor operations, or use of other transportation corridors could occur if site locations were near or adjacent to roadways and other transportation corridors, requiring temporary closures (lane closures on roadways, for example). Coordination would be necessary with the relevant transportation authority (i.e., departments of transportation, airport authorities, railway companies, and harbormasters) to ensure proper coordination during deployment. Based on the impact significance criteria presented in Table 11.2.1-1, such impacts would be less than significant due to the temporary nature of the construction activities, even if such impacts would be realized at one or more isolated locations. Such impacts would be noticeable during the deployment phase, but would be short-term, with no anticipated impacts continuing into the operational phase, unless any large-scale maintenance would become necessary during operations.

Capacity of Local Health, Public Safety, and Emergency Response Services

The capacity of local health, public safety, and emergency response services would experience less than significant impacts during construction or operation phases. During deployment and system optimization, existing services would likely remain operational in a redundant manner ensuring continued operations and availability of services to the public. The only potential impact would be extremely rare – and that is if emergency response services were using transportation infrastructure to respond to an emergency at the exact time that deployment activities were taking place. This type of impact would be isolated at the local or neighborhood level, and the likelihood of such an impact would be extremely low. Once operational, the new network would provide beneficial impacts to the capacity of first responders through enhanced communications infrastructure, thereby increasing capacity for and enhancing the ability of first responders to communicate during emergency response situations. Based on the impact significance criteria presented in Table 11.2.1-1, such potential negative and positive impacts would be less than significant.

Table 11.2.1-1: Impact Significance Rating Criteria for Infrastructure

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Transportation system capacity and safety	Magnitude or Intensity	Creation of substantial traffic congestion/delay and/or a substantial increase in transportation incidents (e.g., crashes, derailments)	Effect that is potentially significant, but with mitigation is less than significant	Minimal change in traffic congestion/delay and/or transportation incidents (e.g., crashes, derailments)	No effect on traffic congestion or delay, or transportation incidents
	Geographic Extent	Regional impacts observed throughout the state/territory		Effects realized at one or multiple isolated locations	NA
	Duration or Frequency	Permanent: Persisting indefinitely		Short-term effects will be noticeable for up to the entire construction phase or a portion of the operational phase	NA
Capacity of local health, public safety, and emergency response services	Magnitude or Intensity	Impacted individuals or communities cannot access health care and/or emergency services, or access is delayed, due to the project activities	Effect is potentially significant, but with mitigation is less than significant	Minor delays to access to care and emergency services that do not impact health outcomes	No impacts on access to care or emergency services
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state)		Impacts only at a local/neighborhood level	NA
	Duration or Frequency	Duration is constant during construction and deployment phase		Rare event during construction and deployment phase	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Modifies existing public safety response, physical infrastructure, telecommunication practices, or level of service in a manner that directly affects public safety communication capabilities and response times	Magnitude or Intensity	Substantial adverse changes in public safety response times and the ability to communicate effectively with and between public safety entities	Effect that is potentially significant, but with mitigation is less than significant	Minimal change in the ability to communicate with and between public safety entities	No perceptible change in existing response times or the ability to communicate with and between public safety entities
	Geographic Extent	Local/City, County/Region, or State/Territory		Local/City, County/Region, or State/Territory	Local/City, County/Region, or State/Territory
	Duration or Frequency	Permanent or perpetual change in emergency response times and level of service		Change in communication and/or the level of service is perceptible but reasonable to maintaining effectiveness and quality of service	NA
Effects to commercial telecommunication systems, communications, or level of service	Magnitude or Intensity	Substantial adverse changes in level service and communications capabilities	Effect that is potentially significant, but with mitigation is less than significant	Minor changes in level of service and communications while transitioning to the new system	No perceptible effect to level of service or communications while transitioning to the new system
	Geographic Extent	Local/City, County/Region, or State/Territory		Local/City, County/Region, or State/Territory	Local/City, County/Region, or State/Territory
	Duration or Frequency	Persistent, long-term, or permanent effects to communications and level of service		Minimal effects to level of service or communications lasting no more than a short period (minutes to hours) during the construction and deployment phase	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Effects to utilities, including electric power transmission facilities and water and sewer facilities	Magnitude or Intensity	Substantial disruptions in the delivery of electric power or to physical infrastructure that results in disruptions, including frequent power outages or drops in voltage in the electrical power supply system ("brownouts"). Disruption in water delivery or sewer capacity, or damage to or interference with physical plant facilities that impact delivery of water or sewer systems	Effect that is potentially significant, but with mitigation is less than significant	Minor disruptions to the delivery of electric power, water, and sewer services, or minor modifications to physical infrastructure that result in minor disruptions to delivery of power, water, and sewer services	There would be no perceptible impacts to delivery of other utilities and no service disruptions.
	Geographic Extent	Local/City, County/Region, or State/Territory		Local/City, County/Region, or State/Territory	Local/City, County/Region, or State/Territory
	Duration or Frequency	Effects to other utilities would be seen throughout the entire construction phase		Effects to other utilities would be of short duration (minutes to hours) and would occur sporadically during the entire construction phase	NA

NA = not applicable

Modifies Existing Public Safety Response Telecommunication Practices, Physical Infrastructure, or Level of Service in a manner that directly affects Public Safety Communication Capabilities and Response Times

The Proposed Action and Alternatives contemplated by FirstNet would not cause negative impacts to existing public safety response telecommunication practices, physical infrastructure, or level of service in a manner that directly affects public safety communication capabilities and response times. Based on the impact significance criteria presented in Table 11.2.1-1, any potential impacts would be less than significant during deployment. As described above, during deployment and system optimization, existing services would likely remain operational in a redundant manner ensuring continued operations and availability of services to the public. Once operational, state, and local public safety organizations would need to evaluate telecommunication practices and standard operating procedures (SOPs). FirstNet's mission is to compliment such practices and SOPs in a positive manner; therefore, only beneficial or complimentary impacts would be anticipated. Public safety communication capabilities and response times would be expected to also experience such beneficial impacts through enhance communications abilities. It some cases, FirstNet would be upgrading physical telecommunications infrastructure, thus such infrastructure would also experience a positive and beneficial impact. Disposal or reuse of old public safety communications infrastructure would also likely need to be considered once the specifics are known.

Effects to Commercial Telecommunication Systems, Communications, or Level of Service

Commercial telecommunication systems, communications, or level of service would experience no impacts, as such commercial assets would be using a different spectrum for communications. FirstNet has exclusive rights to use of the assigned spectrum, and only designated public safety organizations would be authorized to connect to FirstNet's network. Depending on the use patterns of FirstNet's spectrum, such spectrum use may be over-built or under-utilized.[184] Such leases would then have less than significant positive impacts on commercial telecommunication systems, communications, or level of service, per the impact significance criteria presented in Table 11.2.1-1.

Effects to Utilities, including Electric Power Transmission Facilities, and Water and Sewer Facilities

The activities proposed by FirstNet would have less than significant impacts on utilities, including electric power transmission facilities, and water and sewer facilities. Depending on the specific project contemplated, installation of new equipment could require connection with local electric sources, and use of site-specific local generators, on a temporary or permanent basis. Also, depending on the specific project contemplated, the draw or use of power from the

[184] Telecommunications equipment for specific spectrum use can be built where other equipment for other spectrum use already exists. If the new equipment and spectrum is not fully utilized, the geographic region may experience "over-build," where an abundance of under-utilized equipment may exist in that geographic location. This situation can be caused by a variety of factors including changes in current and future use patterns, changes in spectrum allocation, changes in laws and regulations, and other factors.

transmission facilities may need to be examined; however, it is not anticipated that such use of power would have negative impacts, due to the local nature of the proposed activities and the widespread availability and use of the power grid in the United States.

11.2.1.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1, Proposed Action, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to infrastructure and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to infrastructure under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to infrastructure resources since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes or disruption of transportation, telecommunications, or utility services.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would have no impacts to infrastructure resources because there would be no ground disturbance and no interference with existing utility, transportation, or communication systems.
- Satellites and Other Technologies
    - Satellite-Enabled Devices and Equipment: It is anticipated that the use of portable devices that use satellite technology would not impact infrastructure resources because there would be no change to the built or natural environment from the use of portable equipment. Installation of satellite-enabled equipment would not be expected to have any impacts to infrastructure resources, given that construction activities would occur on

existing structures, would not be expected to interfere with existing equipment, and transportation capacity and safety, and access to emergency services would not be impacted.

- Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN, however it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact infrastructure resources, it is anticipated that this activity would have no impact on infrastructure resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to infrastructure as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur as a result of direct interface with existing infrastructure, most notably existing telecommunication infrastructure. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to infrastructure include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of points of presence (POP)[185,] huts, or other associated facilities or hand-holes[186] to access fiber could result in potential impacts to infrastructure resources, depending on the specific assets connected on either end of the buried fiber. If a fiber optic plant is being used to tie into existing telecommunications assets, then localized impacts to telecommunications sites could occur during the deployment phase, however, it is anticipated that this tie-in would cause less than significant impacts as the activity would be temporary and minor.
  - New Build – Aerial Fiber Optic Plant: Installation of a new aerial fiber optic plant could impact new telecommunications infrastructure through the installation of new or replacement of existing, telecommunications poles.
  - Collocation on Existing Aerial Fiber Optic Plant: Similar to new build activities (above), collocation on existing aerial fiber optic plant could include installation of new or replacement towers requiring ground disturbance.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore or inland bodies of water would not impact infrastructure resources because there would be no local infrastructure to impact, other than harbor operations. However, impacts to infrastructure resources could potentially occur as result of the construction of landings

[185] Points of Presence are connections or access points between two different networks, or different components of one network.
[186] A small hole typically large enough for one to insert a hand and arm into for inspection and maintenance activities.

and/or facilities on shore to accept submarine cable, depending on the exact site location and proximity to existing infrastructure.

- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment such as small boxes or huts, or access roads, could potentially impact infrastructure. Impacts could include disruption of service in transportation corridors, disruption of service to telecommunications infrastructure, or other temporary impacts.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads might result in temporary or unintended impacts to current utility services during installation or interconnection activities. Generally, however, these deployment activities would be independent and would not be expected to interfere with other existing towers and structures. In addition, installation activities would have beneficial impacts due to expansion of infrastructure at a local level. Such activities can enhance public safety infrastructure, and other telecommunications as the site could potentially be available for subsequent collocation.
  - Deployable Technologies: Deployable technologies such as Cell on Wheels (COW), Cell on Light Trucks (COLT), or System on Wheels (SOW) are comprised of cellular base stations, sometimes with expandable antenna masts, and generators that connect to utility power cables. Connecting the generators to utility power cables has the potential to disrupt electric power utility systems or cause power outages; however this is expected to be temporary and minor. Some staging or landing areas (depending on the type of technology) could require minor construction and maintenance within public road ROWs and utility corridors, heavy equipment movement, and minor excavation and paving near public roads, which have the potential to impact transportation capacity and safety as these activities could increase transportation congestion and delays. Implementation of deployable technologies could result in potential impacts to infrastructure resources in terms of infrastructure expansion, if deployment requires paving of previously unpaved surfaces or other new infrastructure build to accommodate the deployable technology. Also, beneficial impacts could be realized, as deployable technologies are used when other infrastructure is impaired in some way; so deployable technologies could provide continuity of service during emergency events. Where deployable technologies would be implemented on existing paved surfaces and the acceptable load on those paved surfaces is not exceeded, or where aerial deployable technologies may be launched or recovered from existing paved surfaces, it is anticipated that there would be no impacts to infrastructure resources because there would be no disturbance of the natural or built environment.

In general, the abovementioned activities could potentially impact infrastructure resources in different ways, resulting in both potentially negative and potentially positive impacts. Potential negative impacts to infrastructure associated with deployment could include temporary disruption of various types of transportation corridors, temporary impacts on existing or new telecommunications sites, and more permanent impacts on utilities, if new infrastructure required tie-in to the electric grid. These impacts are expected to be less than significant as the deployment activities will likely be of short duration (generally a few hours to a few months depending on the activity), would be regionally based around the on-going phase of deployment, and minor. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Positive impacts to infrastructure resources may result from the expansion of public safety and commercial telecommunications capacity and an improvement in public safety telecommunications coverage, system resiliency, response times, and system redundancy.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in potential impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no impacts to infrastructure associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors, or if further construction related activities are required along public road and utility ROWs, increased traffic congestion, current telecommunication system interruption, and utility interruptions could occur. These potential impacts would be expected to be minor and temporary as explained above.

Numerous beneficial impacts would be associated with operation of the NPSBN. The new system is intended to result in substantial improvements in public safety response times and the ability to communicate effectively with and between public safety entities, and would also likely result in substantial improvements in level of service and communications capabilities. Operation of the NPSBN is intended to involve high-speed data capabilities, location information, images, and eventually streaming video, which would likely significantly improve communications and the ability of the public safety community to effectively engage and respond. The NPSBN is also intended to have a higher level of redundancy and resiliency than current commercial networks to support the public safety community effectively, even in events of extreme demand. This improvement in the level of resiliency and redundancy is intended to increase the reliability of systems, communications, and level of service, and also minimize disruptions and misinformation resulting from limited or disrupted service. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.1.5 Alternatives Impact Assessment

The following section assesses potential impacts to infrastructure associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to infrastructure as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to infrastructure even if deployment requires expansion of infrastructure, such as paving of previously unpaved surfaces or other new infrastructure built to support deployment. This is primarily due to the small amount of paving or new infrastructure that might have to be constructed to accommodate the deployables. The site-specific location of deployment would need to be considered, and any local infrastructure assets (transportation, telecommunications, or utilities) would need to be considered, planned for, and managed accordingly to try and avoid any negative impacts to such resources. Beneficial impacts could be realized, as deployable technologies are used when other infrastructure is impaired in some way; so deployable technologies could provide continuity of service during emergency events.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to infrastructure resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment, as part of routine maintenance or inspection occurs off an established access road or utility ROW, or if additional maintenance-related construction activities occur within public road and utility ROWs, less than significant impacts would likely still occur to transportation systems or utility services due to the limited amount of new infrastructure needed to accommodate the deployables. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated deployment or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to infrastructure as a result of deployment and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.1, Infrastructure. The state also would not realize positive, beneficial impacts to infrastructure resources described above.

11.2.2 Soils

11.2.2.1 Introduction

This section describes potential impacts to soil resources in New York associated with construction/deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.2.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on soil resources were evaluated using the significance criteria presented in Table 11.2.2-1. As described in Section 3.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to soil resources addressed in this section are presented as a range of possible impacts.

11.2.2.3 Description of Environmental Concerns

Soil Erosion

Soil erosion is an environmental concern of nearly every construction activity that involves ground disturbance. Construction erosion typically only occurs in a small area of land with the actual removal of vegetative cover from construction equipment or by wind and water erosion. Of concern in New York and other states with similar geography and weather patterns is the erosion of construction site soils to natural waterways, where the sediment can impair water and habitat quality, and potentially affect aquatic plants and animals (NRCS, 2000). About 57 percent[187] of New York contains soil types that occur on steep slopes and, therefore, have a medium to high potential for erosion. Those soil types include: Cryods, Orthents, Orthods,

[187] This percentage was calculated by dividing the acres of soils that fall within the suborders listed above by the total soil land cover for the state.

Psamments, Udalfs, Udepts, and Udults (see Section 11.1.2.4, Soil Suborders and Figure 11.1.2-2).

Based on the impact significance criteria presented in Table 11.2.2-1, building of some of FirstNet's network deployment sites could cause potentially significant erosion at locations with highly erodible soil and steep grades. For the majority of projects, impacts to soils would be expected to be less than significant given the short-term and temporary duration of the activities.

To the extent practicable, FirstNet would attempt to minimize ground disturbing construction in areas with high erosion potential due to steep slopes or soil type. Where construction is required in areas with a high erosion potential, FirstNet could implement BMPs and mitigation measures to avoid or minimize impacts, and minimize the periods when exposed soil is open to precipitation and wind (see Chapter 17).

Topsoil Mixing

The loss of topsoil (i.e., organic and mineral topsoil layers) by mixing is a potential impact at all ground disturbing construction sites, including actions requiring clearing, excavation, grading, trenching, backfilling, or site restoration/remediation work.

Based on impact significance criteria presented in Table 11.2.2-1, and due to the relatively small-scale (less than 1 acre) of most FirstNet project sites, as well as the implementation of BMPs and mitigation measures (Chapter 17), minimal topsoil mixing is anticipated.

Soil Compaction and Rutting

Soil compaction and rutting at construction sites could involve heavy land clearing equipment such as bulldozers and backhoes, trenchers and directional drill rigs to install buried fiber, and cranes to install towers and aerial infrastructure. Soils with the highest potential for compaction or rutting were identified by using the STATSGO2 database (see Section 11.1.2.4, Soil Suborders). Heavy equipment can cause perceptible compaction and rutting of susceptible soils, particularly if BMPs and mitigation measures are not implemented.

Soils with the highest potential for compaction or rutting were identified by using the STATSGO2 database (see Section 11.1.2.4, Soil Suborders). The most compaction susceptible soils in New York are Aqualfs, Aquents, Aquepts, Aquods, and Saprists, hydric soils and with poor drainage conditions. These soils constitute about 43 percent of New York's land area,[188] mostly only in the southwestern and northeastern portions of the state (see Figure 11.1.2-2). The potential for compaction or rutting impact would be generally low at FirstNet network deployment sites where other soil types predominate.

Based on impact significance criteria presented in Table 11.2.2-1, the risk of soil compaction and rutting resulting from FirstNet deployment activities would be less than significant, due to the extent of susceptible soils in the state.

[188] This percentage was calculated by dividing the acres of soils that fall within the suborders listed above by the total soil land cover for the state.

Table 11.2.2-1: Impact Significance Rating Criteria for Soils

Type of Effect	Effect Characteristic	Impact Level: Potentially Significant	Impact Level: Less than Significant with BMPs and Mitigation Measures Incorporated	Impact Level: Less than Significant	Impact Level: No Impact
Soil erosion	Magnitude or Intensity	Severe, widespread, and observable erosion in comparison to baseline, high likelihood of encountering erosion-prone soils	Effect that is potentially significant, but with mitigation is less than significant	Perceptible erosion in comparison to baseline conditions; low likelihood of encountering erosion-prone soil types	No perceptible change in baseline conditions
	Geographic Extent	State or territory		Region or county	NA
	Duration or Frequency	Chronic or long-term erosion not likely to be reversed over several years		Isolated, temporary, or short-term erosion that that is reversed over few months or less	NA
Topsoil mixing	Magnitude or Intensity	Clear and widespread mixing of the topsoil and subsoil layers	Effect that is potentially significant, but with mitigation is less than significant	Minimal mixing of the topsoil and subsoil layers has occurred	No perceptible evidence that the topsoil and subsoil layers have been mixed
	Geographic Extent	State or territory		Region or county	NA
	Duration or Frequency	NA		NA	NA
Soil compaction and rutting	Magnitude or Intensity	Severe and widespread, observable compaction and rutting in comparison to baseline	Effect that is potentially significant, but with mitigation is less than significant	Perceptible compaction and rutting in comparison to baseline conditions	No perceptible change in baseline conditions
	Geographic Extent	State or territory		Region or county	NA
	Duration or Frequency	Chronic or long-term compaction and rutting not likely to be reversed over several years		Isolated, temporary, or short term compaction and rutting that is reversed over a few months or less	No perceptible change in baseline conditions

NA = not applicable

11.2.2.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could deploy various types of facilities or infrastructure. Depending on the physical nature and location of FirstNet facilities or infrastructure and the specific action, some activities would result in potential impacts to soil resources and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to soil resources under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Installation of fiber optic cable in existing conduit through existing hand-holes, pulling vaults, junction boxes, huts, and POP structures and would not impact soil resources because it would not produce perceptible changes to soil resources.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would be conducted electronically through existing infrastructure, with no impacts to soil resources. If physical access is required to light dark fiber, it would be through existing hand holes, pulling vaults, junction boxes, huts, and similar existing structures.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: Deployment of temporary or portable equipment that use satellite technology, including COWs, COLTs, SOWs, satellite phones, and video cameras, would not impact soil resources because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the nationwide public safety broadband network (NPSBN); however it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact soil resources, it is anticipated that this activity would have no impact on soil resources.

Activities with the Potential to Have Impacts

Implementation of the Preferred Alternatives could include potential deployment-related impacts to soil resources resulting from ground disturbance activities, including soil erosion, topsoil mixing, and soil compaction and rutting. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to soil resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: New fiber optic cable installation usually requires trenching, plowing (including vibratory plowing), or directional boring, as well as construction of hand-holes, pulling vaults, junction boxes, huts, and POP structures that require ground disturbance. Impacts from fiber optic plant installation and structure construction, as well as associated grading and restoration of the disturbed ground when construction is completed, could result in soil erosion, topsoil mixing, or soil compaction and rutting.
  - New Build – Aerial Fiber Optic Plant: Installation of new utility poles, and replacement/upgrading of existing poles and structures could potentially impact soil resources resulting from ground disturbance for pole/structure installation (soil erosion and topsoil mixing), and heavy equipment use from bucket trucks operating on existing gravel or dirt roads (soil compaction and rutting). Potential impacts to soils are anticipated to be small-scale and short-term.
  - Collocation on Existing Aerial Fiber Optic Plant: Topsoil removal, soil excavation, and excavated material placement during the replacement of poles and structural hardening could result in soil erosion and topsoil mixing. Heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in soil compaction and rutting.
  - New Build – Submarine Fiber Optic Plant: Installation of fiber optic plants in limited nearshore and inland bodies of water could potentially impact soil resources at and near the landings or facilities on shore to accept submarine cable.[189] Soil erosion and topsoil mixing could potentially occur as result of grading, foundation excavation, or other ground disturbance activities. Perceptible soil compaction and rutting could potentially occur due to heavy equipment use during these activities depending on the duration of the deployment activity.
  - Installation of Optical Transmission or Centralized Transmission Equipment: Installation of optical transmission equipment or centralized transmission equipment, including associated new utility poles, hand-holes, pulling vault, junction box, hut, and POP structure installation, would require ground disturbance that could potentially impact soil

[189] Potential impact of submarine fiber optic plant installation to waterbody sediments is evaluated in Water Resources. (Section 11.2.4)

resources. Potential impacts to soils resulting from soil erosion, topsoil mixing, soil compaction, and rutting are anticipated to be small-scale and short-term.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures, such as generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads, or access roads could result in impacts to soil resources. Land/vegetation clearing, excavation activities, landscape grading, and other ground disturbance activities during the installation of new wireless towers and associated structures or access roads could result in soil erosion or topsoil mixing, and heavy equipment use during these activities could result in soil compaction and rutting.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in impacts to soils. However, if structural hardening, and physical security measures required ground disturbance, such as grading, or excavation activities, impacts to soil resources could occur, including soil erosion and topsoil mixing, as well as soil compaction and rutting associated with heavy equipment use.
  - Deployable Technologies: Implementation of deployable technologies could result in potential impacts to soil resources depending on the technology and location for deployment. Potential impacts may result if deployment of vehicles (i.e., SOWs, COWs, COLTs, or UAVs) occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in soil erosion and topsoil mixing. Heavy equipment use associated with these activities may result in soil compaction and rutting. In addition, implementation of deployable technologies themselves could result in soil compaction and rutting if deployed in unpaved areas. Where technologies such as COWs, COLTs, and SOWs are deployed on existing paved surfaces, there would be no impacts to soil resources because there would be no ground disturbance.

In general, the abovementioned activities could potentially involve land/vegetation clearing, topsoil removal, excavation, excavated material placement, trenching or directional boring, construction of access roads, and other impervious surfaces, landscape grading, and heavy equipment movement. Potential impacts to soil resources associated with deployment of this infrastructure could include soil erosion, topsoil mixing, or soil compaction and rutting. These impacts and associated BMPs and mitigation measures to help mitigate or reduce these impacts are expected to be less than significant due to the temporary and small-scale nature of deployment activities. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described earlier, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there would be no impacts to soil resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors, or if the acceptable load of the surface is exceeded, soil compaction and rutting impacts could result as explained above. These impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.2.5 Alternatives Impact Assessment

The following section assesses potential impacts to soils associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to soil resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to soil resources if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. In addition, impacts to soils could occur on paved surfaces if the acceptable load of the surface is exceeded. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in soil erosion and topsoil mixing. Heavy equipment use associated with these activities may result in soil compaction and rutting. In addition, implementation of deployable technologies themselves could also result in soil compaction and rutting if deployed in unpaved areas. These impacts are expected to be less than significant as generally they would be limited to the deployment location and could often be screened or otherwise blocked from view. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to soil resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors, or if the acceptable load of the surface is exceeded, less than significant soil compaction and rutting impacts could result as previously explained above. Finally, if deployable technologies are parked and operated with air conditioning for extended periods, the condensation water from the air conditioner could result in minimal soil erosion. However, it is anticipated that the potential soil erosion would result in less than significant impacts. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed. Therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to soil resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.2, Soils.

11.2.3 Geology

11.2.3.1 Introduction

This section describes potential impacts to New York geology resources associated with deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.3.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on geology resources were evaluated using the significance criteria presented in Table 11.2.3-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to geology addressed in this section are presented as a range of possible impacts.

11.2.3.3 Description of Environmental Concerns

Environmental concerns regarding geology can be viewed as two distinct types, those that would potentially provide impacts to the project, such as seismic hazards, landslides, and volcanic activity, and those that would be impacts from the project, such as land subsidence, mineral and fossil fuel resources, paleontological resources, surface geology, bedrock, topography, physiography, and geomorphology. These concerns and their impacts on geology are discussed below.

Seismic Hazard

As discussed in Section 11.1.3.8, the majority of New York is not at risk to significant earthquake events. As shown in Figure 11.1.3-6, northeastern New York and areas near New York City are at greatest risk to earthquakes throughout the state, though no earthquake over magnitude 6.0 on the Richter scale has ever occurred in the state. Equipment that is exposed to earthquake activity is subject to misalignment, alteration, or, in extreme cases, destruction; all of these activities could result in connectivity loss. Based on the impact significance criteria presented in Table 11.2.3-1, seismic impacts would be less than significant if FirstNet's deployment locations were within high-risk earthquake hazard zones or active fault zones. Given the potential for minor to moderate earthquakes in parts of New York, some amount of infrastructure could be subject to earthquake hazards, in which case BMPs and mitigation measures (see Chapter 17) could help avoid or minimize the potential impacts.

Volcanic Activity

Volcanoes were considered but not analyzed for New York, as they do not occur in New York; therefore, volcanoes do not present a hazard to the state.

Table 11.2.3-1: Impact Significance Rating Criteria for Geology

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Seismic Hazard	Magnitude or Intensity	High likelihood that a project activity could be located within a high-risk earthquake hazard zone or active fault	Effect that is potentially significant, but with mitigation is less than significant	Low likelihood that a project activity could be located within an earthquake hazard zone or active fault	No likelihood of a project activity being located in an earthquake hazard zone or active fault
	Geographic Extent	Hazard zones or active faults are highly prevalent within the state/territory		Earthquake hazard zones or active faults occur within the state/territory, but may be avoidable	Earthquake hazard zones or active faults do not occur within the state/territory
	Duration or Frequency	NA		NA	NA
Volcanic Activity	Magnitude or Intensity	High likelihood that a project activity could be located near a volcano lava or mud flow area of influence	Effect that is potentially significant, but with mitigation is less than significant	Low likelihood that a project activity could be located near a volcanic ash area of influence	No likelihood of a project activity located within a volcano hazard zone
	Geographic Extent	Volcano lava flow areas of influence are highly prevalent within the state/territory		Volcano ash areas of influence occur within the state/territory, but may be avoidable	Volcano hazard zones do not occur within the state/territory
	Duration or Frequency	NA		NA	NA
Landslide	Magnitude or Intensity	High likelihood that a project activity could be located within a landslide area	Effect that is potentially significant, but with mitigation is less than significant	Low likelihood that a project activity could be located within a landslide area	No likelihood of a project activity located within a landslide hazard area
	Geographic Extent	Landslide areas are highly prevalent within the state/territory		Landslide areas occur within the state/territory, but may be avoidable	Landslide hazard areas do not occur within the state/territory

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
	Duration or Frequency	NA		NA	NA
Land Subsidence	Magnitude or Intensity	High likelihood that a project activity could be located within an area with a hazard for subsidence (e.g., karst terrain)	Effect that is potentially significant, but with mitigation is less than significant	Low likelihood that a project activity could be located within an area with a hazard for subsidence	Project activity located outside an area with a hazard for subsidence
	Geographic Extent	Areas with a high hazard for subsidence (e.g., karst terrain) are highly prevalent within the state/territory		Areas with a high hazard for subsidence occur within the state/territory, but may be avoidable	Areas with a high hazard for subsidence do not occur within the state/territory
	Duration or Frequency	NA		NA	NA
Mineral and Fossil Fuel Resource impacts	Magnitude or Intensity	Severe, widespread, observable impacts to mineral and/or fossil fuel resources	Effect that is potentially significant, but with mitigation is less than significant	Limited impacts to mineral and/or fossil resources	No perceptible change in mineral and/or fossil fuel resources
	Geographic Extent	Regions of mineral or fossil fuel extraction areas are highly prevalent within the state/territory		Mineral or fossil fuel extraction areas occur within the state/territory, but may be avoidable	Mineral or fossil fuel extraction areas do not occur within the state/territory
	Duration or Frequency	Long-term or permanent degradation or depletion of mineral and fossil fuel resources		Temporary degradation or depletion of mineral and fossil fuel resources	NA
Paleontological Resources impacts	Magnitude or Intensity	Severe, widespread, observable impacts to paleontological resources	Effect that is potentially significant, but with mitigation is less than significant	Limited impacts to paleontological and/or fossil resources	No perceptible change in paleontological resources.

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
	Geographic Extent	Areas with known paleontological resources are highly prevalent within the state/territory		Areas with known paleontological resources occur within the state/territory, but may be avoidable	Areas with known paleontological resources do not occur within the state/territory
	Duration or Frequency	NA		NA	NA
Surface Geology, Bedrock, Topography, Physiography, and Geomorphology	Magnitude or Intensity	Substantial and measurable degradation or alteration of surface geology, bedrock, topography, physiographic characteristics, or geomorphological processes	Effect that is potentially significant, but with mitigation is less than significant	Minor degradation or alteration of surface geology, bedrock, topography that do not result in measurable changes in physiographic characteristics or geomorphological processes	No degradation or alteration of surface geology, bedrock, topography, physiographic characteristics, or geomorphologic processes
	Geographic Extent	State/territory		State/territory	NA
	Duration or Frequency	Permanent or long-term changes to characteristics and processes		Temporary degradation or alteration of resources that is limited to the construction and deployment phase	NA

NA = Not Applicable

Landslides

As discussed in Section 11.1.3.8, the majority of New York is at low to moderate risk of experiencing landslide events. Based on the impact significance criteria presented in Table 11.2.3-1, potential impacts to landslide potential from deployment or operation of the Proposed Action would have less than significant impacts; however, landslide impacts to the Proposed Action could be potentially significant if FirstNet's deployment locations were within areas in which landslides are highly prevalent. Equipment that is exposed to landslides is subject to misalignment, alteration, or, in extreme cases, destruction; all of these activities could result in connectivity loss. The highest potential for landslides in New York is found along major rivers and lake valleys that were formerly occupied by glacial lakes resulting in glacial lake deposits (glacial lake clays) and usually associated with steeper slopes, such as in the Hudson and Mohawk River Valleys. Equipment that is exposed to landslides is subject to misalignment, alteration, or, in extreme cases, destruction; all of these activities could result in connectivity loss. To the extent practicable, FirstNet would avoid deployment in areas that are susceptible to landslide events. However, given that several of New York's major cities, including Albany and Binghamton, are in areas that experience landslides with moderate to high frequency, some amount of infrastructure could be subject to landslide hazards, in which case BMPs and mitigation measures (see Chapter 17) could help avoid or minimize the potential impacts.

Land Subsidence

As discussed in Section 11.1.3.8, portions of New York are vulnerable to land subsidence due to karst topography and mine collapse. Based on the impact significance criteria presented Table 11.2.3-1, potential impacts to soil subsidence from deployment or operation of the Proposed Action would have less than significant impacts; however, subsidence impacts to the Proposed Action could be potentially significant to the Proposed Action if FirstNet's deployment locations were within areas at high risk to karst topography or mining areas. Equipment that is exposed to land subsidence, such as sinkholes created by karst topography is subject to misalignment, alteration, or, in extreme cases, destruction. Significant long-term land subsidence, due to factors such as aquifer compaction, in coastal areas could lead to relative sea level rise[190] and inundation of equipment. All of these activities could result in connectivity loss. To the extent practicable, FirstNet would avoid deployment in known areas of karst topography or in areas that are subject to sea level rise. However, where infrastructure is subject to landslide hazards, BMPs and mitigation measures, as discussed in Chapter 17, could help avoid or minimize the potential impacts.

Mineral and Fossil Fuel Resource Impacts

Equipment deployment near mineral and fossil fuel resources are not likely to affect these resources. Rather the new construction is only likely to limit access to extraction of these resources. Based on the impact significance criteria presented in Table 11.2.3-1, impacts to

[190] Relative Sea Level Rise: "[Sea level rise that] includes the combined movement of both water and land. Even if sea level was constant, there could be changes in relative sea level. For example, a rising land surface would produce a relative fall in sea level, whereas a sinking land surface would produce a relative rise in sea level." (USGS, 2008)

mineral and fossil fuel resources are unlikely as the Proposed Action could only be potentially significant if FirstNet's deployment locations were to cause severe, widespread, observable impacts to mineral and/or fossil fuel resources. To the extent practicable, FirstNet would avoid construction in areas where these resources exist.

Paleontological Resource Impacts

Equipment installation and construction activities that require ground disturbance could damage existing paleontological resources, which are both fragile and irreplaceable. Based on the impact significance criteria presented in Table 11.2.3-1: Impact Significance Rating Criteria for Geology, impacts to paleontological resources could be potentially significant if FirstNet's buildout/deployment locations uncovered paleontological resources during construction activities. As discussed in Section 11.1.3.7, fossils are abundant throughout parts of New York. Potential impacts to fossil resources should be considered on a site-by-site basis, and BMPs and mitigation measures (see Chapter 17) may be required to help avoid or minimize the potential impacts.

Surface Geology, Bedrock, Topography, Physiography, and Geomorphology

Equipment installation and construction activities would not require modification or removal of the surrounding terrain and therefore would not cause irreparable damage to that area’s geology, topography, physiography, or geomorphology. Based on the impact significance criteria presented in Table 11.2.3-1, impacts could be potentially significant if FirstNet’s deployment were to cause substantial and measurable degradation or alteration of surface geology, bedrock, topography, physiographic characteristics, or geomorphological processes. Construction activities related to the Proposed Action and Alternatives are likely to be less than significant, because they are not likely to require removal of significant volumes of terrain. When ground disturbance is required, BMPs and mitigation measures (see Chapter 17) could be implemented to help avoid or minimize the potential impacts.

11.2.3.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operation activities.

Deployment Impacts

Implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities have the potential to be impacted by geologic hazards, some activities could result in potential impacts to geology, and other activities would have no impacts. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to geology under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. In most cases, there would be no impacts to geologic resources since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to geologic resources because there would be no ground disturbance.
- Satellites and Other Technologies
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN, however it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact geologic resources, it is anticipated that this activity would have no impact on geologic resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to geologic resources, or resulting from geologic hazards due to implementation of the Preferred Alternative, would encompass a range of impacts that could occur as a result of ground disturbance activities, including loss of mineral and fuel resources and paleontological resources. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to geologic resources, or impacts from geologic hazards, include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POP huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to geologic resources due to associated ground disturbance, such as impacts to fuel and mineral resources or paleontological resources. Where equipment is installed in locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that equipment could be affected by that hazard.

- New Build – Aerial Fiber Optic Plant: Installation of new utility poles, and associated use of heavy equipment during construction, could result in potential impacts to geologic resources due to associated ground disturbance. Where equipment is installed in locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that equipment could be affected by that hazard.

- Collocation on Existing Aerial Fiber Optic Plant: Replacement of utility poles and structural hardening, and associated use of heavy equipment during construction, could result in potential impacts to geologic resources due to associated ground disturbance. Where equipment is installed in locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that equipment could be affected by that hazard.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore or inland bodies of water is not expected to impact geologic resources including marine paleontological resources. However, where landings and/or facilities for submarine cable are installed at locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that equipment could be affected by that hazard.

- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts and require ground disturbance in locations that are susceptible to geologic hazards (e.g., land subsidence, landslides, or earthquakes), it is possible that they could be affected by that hazard.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to geologic resources. Land/vegetation clearing, excavation activities, landscape grading, and other ground disturbance activities during the installation of new wireless towers and associated structures or access roads could result in erosion or perturbation of geologic resources. Where equipment is installed in locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that equipment could be affected by that hazard.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in ground disturbance. However, if additional power units, structural hardening, and physical security measures required ground disturbance, such as grading, or excavation activities, impacts to geologic resources could occur due to ground disturbance. Where equipment is installed in locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that equipment could be affected by that hazard.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: In most cases, the installation of permanent equipment on existing structures, adding equipment to satellites launched for other purposes, or the use of portable devices that use satellite technology would not impact geologic resources because those activities would not require ground disturbance. However, where equipment is permanently installed in locations that are susceptible to landslides, land subsidence, and other geologic hazards, it is possible that they could be affected by that hazard. The use of portable satellite-enabled devices would not impact geologic resources nor would it be affected by geologic hazards because there would be no ground disturbance nor any impact to the built or natural environment.

In general, the abovementioned activities could potentially involve ground disturbance resulting from land/vegetation clearing, topsoil removal, excavation, excavated material placement, trenching or directional boring, construction of access roads and other impervious surfaces, landscape grading, and heavy equipment movement. Potential impacts to geology associated with deployment could include minimal removal of bedrock or mineral resources, or adverse impacts to installed equipment resulting from geologic hazards (e.g., seismic hazards, landslides, and land subsidence). Specific FirstNet projects are likely to be small-scale; correspondingly, disturbance to geologic resources for those types of projects with the potential to impact geologic resources is also expected to be small-scale. These impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no impacts to geology associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections.

The operation of the Preferred Alternative could be affected by to geologic hazards including seismic activity, volcanic activity, landslides, and land subsidence. However, potential impacts would be anticipated to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.3.5 Alternatives Impact Assessment

The following section assesses potential impacts to geology associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to geology as a result of implementation of this alternative could be as described below.

Deployment Impacts

Implementation of deployable technologies on existing paved surfaces would not result in impacts to geologic resources (or from geologic hazards) as there would be no ground disturbance and mobile technologies could be moved to avoid geologic hazards. Potential impacts may result if deployment of vehicles (i.e., SOWs, COWs, COLTs, or UAVs) occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to geologic resources (or from geologic hazards) associated with routine inspections of the Preferred Alternative.

The operation of the Deployable Technologies Alternative could be affected by to geologic hazards including seismic activity, volcanic activity, landslides, and land subsidence. However, potential impacts would be anticipated to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure, or satellites and other technologies. As a result, there would be no impacts to geologic resources (or from geologic hazards) as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.2.3, Geology.

11.2.4 Water Resources

11.2.4.1 Introduction

This section describes potential impacts to water resources in New York associated with construction/deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.4.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on water resources were evaluated using the significance criteria presented in Table 11.2.4-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to water resources addressed in this section are presented as a range of possible impacts.

11.2.4.3 Description of Environmental Concerns

Potential Water Quality Impacts

Water quality impaired waterbodies are those waters that have been identified as not supporting their appropriate uses. Projects in watersheds of impaired waters may be subject to heightened permitting requirements. For example, the CWA requires states to assess and report on the quality of waters in their state. Section 303(d) of the CWA requires states to identify impaired waters. For these impaired waters, states must consider the development of a Total Maximum Daily Load (TMDL) or other strategy to reduce the input of the specific pollutant(s) restricting waterbody uses, in order to restore and protect such uses.

Most of New York’s rivers and streams are in good condition, although more than half of New York’s estuaries, bays, and lakes are impaired (see Table 11.1.4-2, Figure 11.1.4-3). Legacy discharges of polychlorinated biphenyl (PCBs), dioxins, and pesticides have affected all of New

York's Great Lakes shoreline, which have resulted in fish consumption advisories for many species. Groundwater quality within the state is generally good. (USEPA, 2015ah) (NYSDEC 2015aa)

Deployment activities can contribute pollutants in a number of ways but the primary manner is increased sediment in surface waters. Vegetation removal on site exposes soils to rain and wind that can increase erosion. Impacts to water quality may occur from post construction vegetation management, such as herbicides, that may leach into groundwater or move to surface waters through soil erosion or runoff, spray drift, or inadvertent direct overspray. Fuel, oil, and other lubricants from equipment can contaminate groundwater and surface waters if carried in runoff. Other water quality impacts could include changes in temperature, water volume flows, pH or dissolved oxygen levels, water odor, color, or taste, or addition of suspended solids.

Soil erosion or the introduction of suspended solids into waterways from implementation of the Preferred Alternative could contribute to degradation of water quality. If the Proposed Action and Alternatives would disturb more than one acre of soil, a State Pollutant Discharge Elimination System (SPDES) or USEPA NPDES Construction General Permit (CGP) would be required. As part of the permit application for the CGP, a stormwater pollution prevention plan (SWPPP) would need to be prepared containing BMPs that would be implemented to prevent, or minimize the potential for, sedimentation and erosion. Adherence to the CGP and the BMPs would help prevent sediment and suspended solids from entering the waterways and ensure that effects on water quality during construction would not be adverse.

Deployment activities associated with the Proposed Action have the potential to increase erosion and sedimentation around construction and staging areas. Grading activities associated with construction would potentially result in a temporary increase in the amount of suspended solids running off construction sites. If a storm event were to occur, construction site runoff could result in sheet erosion of exposed soil. If not adequately controlled, water runoff from these areas would have the potential to degrade surface water quality. Implementing BMPs could reduce potential impacts to surface water quality.

Expected deployment activities would not violate applicable state, federal (e.g., CWA, and Safe Drinking Water Act), and local regulations, cause a threat to the human environment, biodiversity, or ecological integrity through water degradation, or cause a sediment water quality violation from local construction, or otherwise substantially degrade water quality.

Therefore, based on the impact significance criteria presented in Table 11.2.4-1, water quality impacts would likely be less than significant, and could be further reduced if BMPs and mitigation measures were to be incorporated where practicable and feasible.

Table 11.2.4-1: Impact Significance Rating Criteria for Water Resources

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Water quality (groundwater and surface water) - sedimentation, pollutants, nutrients, water temperature	Magnitude or Intensity	Groundwater contamination creating a drinking quality violation, or otherwise substantially degrade groundwater quality or aquifer; local construction sediment water quality violation, or otherwise substantially degrade water quality; water degradation poses a threat to the human environment, biodiversity, or ecological integrity. Violation of various regulations including: CWA, SDWA	Effect that is potentially significant, but with mitigation is less than significant.	Potential impacts to water quality, but potential effects to water quality would be below regulatory limits and would naturally balance back to baseline conditions.	No changes to water quality; no change in sedimentation or water temperature, or the presence of water pollutants or nutrients.
	Geographic Extent/Context	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Chronic and long term changes not likely to be reversed over several years or seasons		The impact is temporary, lasting no more than six months.	NA
Floodplain degradation*	Magnitude or Intensity	The use of floodplain fill, substantial increases in impervious surfaces, or placement of structures within a 500-year flood area that will impede or redirect flood flows or impact floodplain hydrology. High likelihood of encountering a 500-year floodplain within a state or territory.	Effect that is potentially significant, but with mitigation is less than significant.	Activities occur inside the 500-year floodplain, but do not use fill, do not substantially increase impervious surfaces, or place structures that will impede or redirect flood flows or impact floodplain hydrology, and do not occur during flood events. Low likelihood of encountering a 500-year floodplain within a state or territory.	Activities occur outside of floodplains and therefore do not increase fill or impervious surfaces, nor do they impact flood flows or hydrology within a floodplain.

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Chronic and long term changes not likely to be reversed over several years or seasons		The impact is temporary, lasting no more than one season or water year, or occurring only during an emergency.	NA
Drainage pattern alteration	Magnitude or Intensity	Alteration of the course of a stream of a river, including stream geomorphological conditions, or a substantial and measurable increase in the rate or amount of surface water or changes to the hydrologic regime.	Effect that is potentially significant, but with mitigation is less than significant.	Any alterations to the drainage pattern are minor and mimic natural processes or variations.	Activities do not impact drainage patterns
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Impact occurs in perennial streams, and is ongoing and permanent		The impact is temporary, lasting no more than six months.	NA
Flow alteration	Magnitude or Intensity	Consumptive use of surface water flows or diversion of surface water flows such that there is a measurable reduction in discharge	Effect that is potentially significant, but with mitigation is less than significant.	Minor or no consumptive use with negligible impact on discharge.	Activities do not impact discharge or stage of waterbody (stream height)
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Impact occurs in perennial streams, and is ongoing and permanent		Impact is temporary, not lasting more than six months.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Changes in groundwater or aquifer characteristics	Magnitude or Intensity	Substantial and measurable changes in groundwater or aquifer characteristics, including timing, duration, and frequency of groundwater flow, and other changes to the groundwater hydrologic regime.	Effect that is potentially significant, but with mitigation is less than significant.	Any potential impacts to groundwater or aquifers are temporary, lasting no more than a few days, with no residual impacts	Activities do not impact groundwater or aquifers
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Impact is ongoing and permanent		Potential impact is temporary, not lasting more than six months.	NA

* - Since public safety infrastructure is considered a critical facility, project activities should avoid the 500-year floodplain wherever practicable, per the Executive Orders on Floodplain Management (EO 11988 and EO 13690).
NA = not applicable

During implementation of the Proposed Action and Alternatives, there is the potential to encounter shallow groundwater due to clearing and grading activities, shallow excavation, or relocation of utility lines. This is unlikely, as trenching is not expected to exceed a 48-inch depth. However, groundwater contamination may exist in areas directly within or near the project area. If trenching[191] were to occur near or below the existing water table (depth to water), then dewatering would be anticipated at the location. Residual contaminated groundwater could be encountered during dewatering activities. Construction activities would need to comply with New York dewatering requirements. Any groundwater extracted during dewatering activities or as required by a dewatering permit would either be treated prior to discharge or disposed of at a wastewater treatment facility.

Due to average thickness of most New York aquifers, there is little potential for groundwater contamination within a watershed or multiple watersheds. Thus, it is unlikely that the majority of FirstNet's deployment locations would result in a drinking quality violation, or otherwise substantially degrade groundwater quality or aquifer, and based on the impact significance criteria presented in Table 11.2.4-1, there would likely be less than significant impacts on groundwater quality within most of the state. It is not expected that the majority of FirstNet's deployment locations would result in a drinking quality violation, or otherwise substantially and measurably degrade groundwater quality or aquifer characteristics. However, in certain parts of the state, Long Island for example, groundwater is close to the surface. In areas where groundwater is close to the surface, then site-specific analysis, BMPs, and mitigation measures could be implemented to further reduce potential impacts.

Floodplain Degradation

Floodplains are low-lying lands next to rivers and streams. When left in a natural state, floodplain systems store and dissipate floods without adverse impacts on humans, buildings, roads and other infrastructure. The 500-year floodplain is the area of minimal flood hazard, where there is a 0.2-percent-annual-chance flood. Some projects may be outside of a floodplain, but still be in an area with known flooding history.

Based on the impact significance criteria presented in Table 11.2.4-1, floodplain degradation impacts would be potentially less than significant since the majority of FirstNet's likely deployment activities, on the watershed or subwatershed level, would occur inside the 500-year floodplain, would use minimal fill, would not substantially increase impervious surfaces, structures would not impede or redirect flood flows or impact floodplain hydrology, and would not occur during flood events with the exception of deployable technologies which may be deployed in response to an emergency. Additionally, any effects would be temporary, lasting no more than one season or water year,[192] or occur only during an emergency.

Examples of activities that would have less than significant impacts include:

[191] Telecommunications activities involve laying conduit, with minimal trenching. Trenching activities would likely be at a minimal depth (less than 36 inches) and width (6 to 12 inches).
[192] A water year is defined as "the 12-month period October 1, for any given year through September 30, of the following year. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months." (USGS, 2014h)

- Construction of any structure in the 500-year floodplain but is built above base flood pursuant to floodplain management regulations.
- Land uses that include pervious surfaces such as gravel parking lots.
- Land uses that do not change the flow of water or drainage patterns.
- Limited clearing or grading activities.

Implementation of BMPs and mitigation measures would reduce the risk of additional impacts to floodplain degradation (see Chapter 17).

Drainage Pattern Alteration

Flooding and erosion from land disturbance can changes drainage patterns. Stormwater runoff causes erosion while construction activities and land clearing can change drainage patterns. Clearing or grading activities, or the creation of walls or berms can alter water flow in an area or cause changes to drainage patterns. Drainage can be directed to stormwater drains, storage, and retention areas designed to slow water and allow sediments to settle out. Improperly handled drainage can cause increased erosion, changes in stormwater runoff, flooding, and damage to water quality. Existing drainage patterns can be modified by channeling (straightening or restructuring natural watercourses); creation of impoundments (detention basins, retention basins, and dams); stormwater increases; or altered flow patterns.

According to the significance criteria in Table 11.2.4-1, any temporary (lasting less than six months) alterations to drainage patterns that are minor and mimic natural processes or variations within the watershed or subwatershed level would be considered less than significant.

Since the proposed activities would not substantially alter drainage patterns in a way that result in, or alter the course of a stream or river, create a substantial and measurable increase in the rate and amount of surface water, or change the hydrologic regime, and any effects would be short-term, impacts to drainage patterns would be less than significant. BMPs, mitigation measures, and avoidance could reduce any potentially significant impacts.

Example of projects that could have minor changes to the drainage patterns include:

- Land uses with pervious surfaces that create limited stormwater runoff.
- Where stormwater is contained onsite and does not flow to or impact surface waterbodies offsite on other properties.
- Activities designed so that the amount of stormwater generated before construction is the same as afterwards.
- Activities designed using low impact development (LID) techniques for stormwater.

Flow Alteration

Flow alteration refers to the modification of flow characteristics, relative to natural conditions. Human activities may change the amount of water reaching a stream, divert flow through artificial channels, or alter the shape and location of streams. Surface water and groundwater withdrawals can alter flow by reducing water volumes in streams. Withdrawals may return to the surface/groundwater system at a point further downstream, be removed from the watershed through transpiration by crops, lawns or pastures, or be transferred to another watershed altogether (e.g., water transferred to a different watershed for drinking supply). Altered flow can increase flooding and introduce more erosion and potential for pollution. Alternatively, if water is diverted from its normal flow, the opposite may occur; wetlands and streams may not receive as much water as necessary to maintain the ecology and previous functions.

Activities that do not impact discharge or stage of waterbody (stream height) are not anticipated to have an impact on flow, according to Table 11.2.4-1. Projects that include minor consumptive use of surface water with less than significant impacts on discharge (do not direct large volumes of water into different locations) on a temporary (no more than six months) are likely to have less than significant impacts on flow alteration, on a watershed or subwatershed level. Examples of projects likely to have less than significant impacts include:

- Construction of any structure in a 100-year or 500-year floodplain that is built above base flood elevation pursuant to floodplain management regulations.
- Land uses that are maintaining or increasing pervious surfaces.
- Land uses that do not change the flow of water or drainage patterns offsite or into surface waterbodies that have not received that volume of stormwater before.
- Minor clearing or grading activities.

Since the proposed activities would not likely alter flow characteristics or change the hydrologic regime, impacts would be less than significant impacts to flow alteration. BMPs, mitigation measures, and avoidance could be implemented to further reduce any impacts.

Changes in Groundwater or Aquifer Characteristics

As described in Section 11.1.4.7, approximately 25 percent (6 million) of New York residents rely on groundwater as a source of potable water. Groundwater is an important natural resource used by industrial, commercial, agricultural, and residential uses for manufacturing, irrigation, and drinking water purposes. Generally, the water quality of New York's aquifers is suitable for drinking and daily water needs (NYSDEC, 2012b). Once a groundwater supply is exhausted or contaminated, it is very expensive, and sometimes impossible, to replace. Water supply demand from the deployment activities is unlikely to exceed safe and sustainable withdrawal capacity rate of the local supply or aquifer.

Storage of generator fuel over groundwater or an aquifer would unlikely cause any impacts to water quality. Activities that may cause changes is groundwater or aquifer characteristics include:

- Excavation, mining, or dredging during or after construction.
- Any liquid waste, including but not limited to wastewater, generation.
- Storage of petroleum or chemical products.

Private and public water supplies often use groundwater as a water source. To maintain a sustainable system, the amount of water withdrawn from these groundwater sources must be balanced with the amount of water returned to the groundwater source (groundwater recharge).

Deployment activities should be less than significant since they would not substantially deplete supplies of potable groundwater, as any construction dewatering would be short-term. The siting of deployment activities should be considered to avoid areas that would extract groundwater from potable groundwater sources in the area. According to Table 11.2.4-1, potentially significant impacts to groundwater or aquifer characteristics would only occur if actions resulted in substantial and measurable changes in groundwater or aquifer characteristics, including volume, timing, duration, and frequency of groundwater flow, and other changes to the groundwater hydrologic regime on a watershed or within multiple watersheds that is ongoing and permanent.

11.2.4.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operation activities.

Deployment Impacts

As described in Section 11.2.1.2, Proposed Action, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to water resources and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to potentially significant impacts depending on the deployment scenario or site-specific conditions. The impact on the water resources that could be affected would depend on the watershed, duration (chronic or short-term) and frequency (many years or a few months) the resource would be used, and the water resource's current use (sole source for drinking water, considered exceptional value for recreation, or provides critical habitat for a species).

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Infrastructure, the following are likely to have no impacts to water resources under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to water resources since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to water resources because there would be no ground disturbance.
- Satellites and Other Technologies

- Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact water resources because those activities would not require ground disturbance.

- Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact water resources, it is anticipated that this activity would have no impact on water resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to water resources because of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including impaired water quality. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to water resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to water resources. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Trenching would not be expected to occur near or below the existing water table (depth to water). Implementing BMPs and mitigation measures could reduce impact intensity.

  - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore or inland bodies of water would impact water resources from a short-term increase in suspended solids in water. Site-specific impact assessment could be required to marine and shoreline environments prior to installation to fully assess potential impacts to lake or river coastal environments.

  - New Build – Aerial Fiber Optic Plant: Potential impacts would be similar to Buried Fiber Optic Plant. Ground disturbance activities could cause impacts to water quality from increased suspended solids; groundwater impacts from trenching activities are not expected. If a new roadway were built, additional impervious surface would not be expected to impact water resources or the overall amount of runoff and nonpoint pollution.

  - Collocation on Existing Aerial Fiber Optic Plant: Replacement of poles or structural hardening could result in ground disturbance that could cause impacts to water quality from increased suspended solids.

  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading or other ground disturbance to install small boxes or huts, or access roads, there could potentially be direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Trenching would not be expected to occur near or below the existing water table (depth to water). If installation of transmission equipment would occur in existing boxes or huts and require no ground disturbance, there would be no impacts to water resources.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security lighting, electrical feeds, and concrete foundations and pads) or access roads could result in potential direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Trenching would not be expected to occur near or below the existing water table (depth to water). Implementing BMPs could reduce impact intensity. If a new roadway were built, additional impervious surface would not be expected to impact water resources or the overall amount of runoff and nonpoint pollution.

  - Deployable Technologies: Implementation of land-based deployable technologies could result in potential impacts to water resources if deployment involves movement of equipment through streams, occurs in riparian or floodplain areas, occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites or deployment in unpaved areas. The amount of impact depends on the land area affected, installation technique, and location. Implementing BMPs and mitigation measures could reduce impact intensity. The activities could also result in indirect impacts on water quality if fuels leak into surface or groundwater. Where deployable technologies would be implemented on existing paved surfaces, or where aerial and vehicular deployable technologies may be used on existing paved surfaces, it is anticipated that there would be no impacts to water resources because there would be no ground disturbance.

- Deployment of drones, balloons, blimps, or piloted aircraft could have indirect impacts on water quality if fuels spill or other chemicals seep into ground or surface waters. In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to water resources associated with deployment of this infrastructure could include water quality impacts, but are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, or poles; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to water resources associated with deployment of this infrastructure could include water quality impacts. BMPs to help mitigate or reduce any potential impacts are described in Chapter 17.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities, and are expected to have no impacts. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. Impacts to surface and groundwater quality from routine operations and maintenance, such as herbicide application to control vegetation, are not expected. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.4.5 Alternatives Impact Assessment

The following section assesses potential impacts to water resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to water resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to water resources could occur on paved surfaces if there is any runoff into the surface water. Some staging or launching/landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Implementing the BMPs and mitigation measures identified in Chapter 17 could further avoid or reduce potential impacts. The activities could also result in indirect impacts on water quality if fuels leak into surface or groundwater.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Deployable Technologies Alternative would consist of routine maintenance and inspection of the deployable technologies. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The water resources impacts would depend on the watershed, duration (chronic or short-term) and frequency (many years or a few months) the resource would be used, and the water resource's current use (sole source for drinking water, considered exceptional value for recreation, or provides critical habitat for a species).

It is anticipated that there would be less than significant impacts to water resources associated with routine inspections of the Deployable Technologies Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors and near waterbodies, the resulting ground disturbance could increase sedimentation in waterbodies, potentially impacting water quality. It is assumed that routine maintenance would not include operation of vehicles or equipment in waterbodies. Finally, if ground-based deployable technologies are parked and operated with air conditioning for extended periods of time, the condensation water from the air conditioner could result in soil erosion that could potentially impact waterbodies if the deployables are located adjacent to waterbodies. Site maintenance, including mowing or herbicides, may result in less than significant effects to water quality, due to the small-scale of expected FirstNet activities in any particular location. In addition, the presence of new access roads could increase the overall amount of impervious surface in the area, and increase runoff effects on water resources, as explained above. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to water resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.4, Water Resources.

11.2.5 Wetlands

11.2.5.1 Introduction

This section describes potential impacts to wetlands in New York associated with construction/deployment and operation of the Proposed Action and Alternatives. Chapter 17 identifies BMPs and mitigation measures, for a listing of BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts

11.2.5.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on wetlands were evaluated using the significance criteria presented in Table 11.2.4-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to wetlands addressed in this section are presented as a range of possible impacts.

11.2.5.3 Description of Environmental Concerns

Potential Direct Wetland Loss (Fill or Conversion to Non-Wetland)

Construction-related impacts from several of the deployment activities have the potential for direct wetland impacts such as filling, draining, or conversion to a non-wetland. Examples include placement of fill in a wetland to construct a new tower, trenching through a wetland or directly connected waterway to install a cable, and placement of a structure (tower, building) within the wetland.

Wetlands regulate the quality and quantity of surface and groundwater supplies, reduce flood hazards by serving as retention basins for surface runoff, and maintain water supplies after floodwaters subside. If wetlands were filled, the entire area may be at risk for increased flooding. There could be a loss of open space to be enjoyed by the community, and decreased wildlife populations may be observed due to displacement and increased noise, light, and other human disturbance. To the extent practicable or feasible, FirstNet and/ or their partners would avoid filling wetlands or altering the hydrologic regime so that wetlands would not be lost or converted to non-wetlands. Loss of high and low-quality wetlands would be less than significant given the amount of land disturbance associated with the project locations (generally less than an acre) and the short time-frame of deployment activities. Additionally, all site-specific locations will be subject to an environmental review to help ensure environmental concerns are addressed.

Potential wetlands impacts can be further reduced by implementing BMPs and mitigation measures (see Chapter 17).

Table 11.2.5-1: Impact Significance Rating Criteria for Wetlands

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Direct wetland loss (fill or conversion to non-wetland)	Magnitude or Intensity	Substantial loss of high-quality wetlands (e.g., those that provide critical habitat for sensitive or listed species, are rare or a high-quality example of a wetland type, are not fragmented, support a wide variety of species, etc.); violations of Section 404 of the CWA	Effect that is potentially significant, but with mitigation is less than significant	Impacts to lower quality wetlands (e.g., not rare or unique, that have low productivity and species diversity, and those that are already impaired or impacted by human activity)	No direct loss of wetlands.
	Geographic Extent/Context	Watershed level, and/or within multiple watersheds		Watershed or subwatershed level	NA
	Duration or Frequency	Chronic and long term changes not likely to be reversed over several years or seasons		Periodic and/or temporary loss reversed over 1-2 growing seasons with or without active restoration	NA
Other direct effects: vegetation clearing; ground disturbance; direct hydrologic changes (flooding or draining); direct soil changes; water quality	Magnitude or Intensity	Substantial and measurable changes to hydrological regime of the wetland impacting salinity, pollutants, nutrients, biodiversity, ecological integrity, or water quality; introduction and establishment of invasive species to high quality wetlands	Effect that is potentially significant, but with mitigation is less than significant	Impacts to lower quality wetlands affecting the hydrological regime including salinity, pollutants, nutrients, biodiversity, ecological integrity, or water quality; introduction and establishment of invasive species to high quality wetlands	No direct impacts to wetlands affecting vegetation, hydrology, soils, or water quality
	Geographic Extent	Watershed level, and/or within multiple watersheds		Watershed or subwatershed level	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
degradation (spills or sedimentation)	Duration or Frequency	Long-term or permanent alteration that is not restored within two growing seasons, or ever		Periodic and/or temporary loss reversed over 1-2 growing seasons with or without active restoration	NA
Indirect effects:[2] change in function(s)[3] change in wetland type	Magnitude or Intensity	Changes to the functions or type of high quality wetlands (e.g., those that provide critical habitat for sensitive or listed species, are rare or a high-quality example of a wetland type, are not fragmented, support a wide variety of species, etc.)	Effect that is potentially significant, but with mitigation is less than significant	Impacts to lower quality wetlands (e.g., not rare or unique, that have low productivity and species diversity, and those that are already impaired or impacted by human activity)	No changes in wetland function or type
	Geographic Extent	Watershed level, and/or within multiple watersheds		Watershed or subwatershed level	NA
	Duration or Frequency	Long-term or permanent		Periodic and/or temporary loss reversed over 1-2 growing seasons with or without active restoration	NA

[1] "Magnitude" is defined based on the type of wetland impacted, using USACE wetland categories. Category 1 are the highest quality, highest functioning wetlands
[2] Indirect effects are those resulting from direct effects, but they occur elsewhere in space and/or time. Includes indirect hydrologic effects (wetting or drying) that in turn alters wetland function or type
[3] Wetland functions include hydrologic, ecological, geomorphic, and social functions typically assessed for wetlands as part of USACE compensatory mitigation planning. Typical functions assessed may include flood attenuation, bank stabilization, water quality, organic matter input/transport, nutrient processing, wildlife habitat, T/E species habitat, biodiversity, recreational/social value.
NA = not applicable

There are more than 2 million acres of palustrine and estuarine wetlands throughout New York (USFWS, 2014). Palustrine (freshwater) wetlands are found on river and lake floodplains across the state, and estuarine/marine (tidal) wetlands present in Long Island, New York City, and up the Hudson River to the dam in Troy, NY (NYSDEC, 2015aj), as shown in Section 11.1.5, Figures 11.1.5-1, 11.1.5-2, and 11.1.5-3.

Based on the impact significance criteria presented in Table 11.2.5-1, and given the temporary nature of most proposed activities, the deployment activities would most likely have less than significant direct impacts on wetlands.

In New York, as discussed in Section 11.1.5.4, Wetlands, regulated high quality wetlands include bogs, fens, and wetlands associated with the Hudson River National Estuarine Research Reserve (NERR), and the wetlands in the East-of-Hudson Watershed. Also, though not protected by the state, woodland (vernal) pools are considered wetlands of special concern in New York.

- In New York, areas classified as a bog or fen are protected under the USACE Nationwide permit due to the scarcity of this habitat in the state and the difficulty with in-kind mitigation. Bogs are acidic wetlands that form thick organic (peat) deposits up to 50 feet deep or more. They have little groundwater influence and are recharged through precipitation. In areas such as the Adirondacks, the stagnant, nutrient-poor, acidic water slows all processes in a bog, including nutrient recycling, making bogs very sensitive to external disturbance. (APA, 2013b), (NYSDEC, 2014a) Fens, unlike bogs, are nutrient-rich, grass- and sedge-dominated emergent wetlands that are recharged from groundwater and have continuous running water. This wet meadow habitat supports distinctive plant communities, including many species that are restricted to New York. Several state-listed rare plants and animals occur in fens. (NYSDEC, 2014a)

- The Hudson River NERR includes approximately 4,800 acres of palustrine and estuarine wetlands and uplands at four sites and spans 100 miles of the Hudson River Estuary (see Figure 11.1.4-2 in Water Resources, Section 11.1.4.3). From north to south, the sites are Stockport Flats, Tivoli Bays, Iona Island, and Piermont Marsh. Influenced by the ocean's tides for more than half its length, the Hudson River NERR includes a wide range of wetland habitats, from non-tidal swamps and freshwater wetlands in Stockport Flats, to freshwater tidal mudflats and marshes on Tivoli Bays, and brackish marshes of Piermont to the slightly brackish wetlands of Iona Island. (NOAA, 2015l)

- The East-of-Hudson watershed of the New York City Water Supply includes portions of Duchess, Putnam, and Westchester Counties, as shown on Figure 11.1.4-2 in Water Resources, Section 11.1.4.3. The East-of-Hudson portion of the New York City Watershed occupies 387 square miles. Wetlands and deepwater habitats occupy approximately 12 percent of the watershed. (NYCDEP, 2009)

- Woodland pools are palustrine wetlands that the state has identified as wetlands of special concern. Found primarily in the Hudson River Valley, woodland pools are a type of small, temporary wetland (or vernal pool) present in forested areas, though the pools themselves lack trees. The pools occur in shallow depressions that fill from spring or fall precipitation, and are usually dry by late summer or during droughts since they are not connected to a permanent water source. (NYSDEC, 2015am). Vernal pools on Long Island are important breeding habitat for the state endangered tiger salamander (NYSDEC, 2014a). Due to their small size (less than 12.4 acres), woodland pools are not protected by state and federal wetland regulations, nor included on state wetland maps, and are often overlooked by state planners.

If any of the proposed deployment activities were to occur in these high quality wetlands, potentially significant impacts could occur. High quality wetlands occur throughout the state, and are not always included on state maps; therefore, site-specific analysis would be required, in addition to BMPs and mitigation measures to avoid potentially significant impacts to wetlands. To assist with avoidance, all wetlands within the East-of-Hudson Watershed (as shown in Figure 11.1.4-2 in Water Resources, Section 11.1.4.3), are high quality wetlands.

Potential Other Direct Effects

Direct impacts consist of altering the chemical, physical, or biological components of a wetland to the extent that changes to the wetland functions occur. However, direct impacts would not result in a loss of total wetland acreage. Changes, for example, could include conversion of a forested wetland system to a non-forested state through chemical, mechanical, or hydrologic manipulation; altered hydrologic conditions (increases or decreases) such as stormwater discharges or water withdrawals that alter the functions of the wetlands.

Based on the impact significance criteria presented in Table 11.2.5-1, construction-related deployment activities that result in long-term or permanent, substantial, and measurable changes to hydrological regime of the wetland (i.e., changes in salinity, pollutants, nutrients, biodiversity, ecological integrity, or water quality) may cause potentially significant impacts. In addition, introduction and establishment of invasive species to high quality wetlands within a watershed or multiple watersheds are potentially significant. Other direct effects to high- and low-quality wetlands would be less than significant given the amount of land disturbance associated with the project locations (generally less than an acre) and the short time-frame of deployment activities and the application of federal, state, and local wetlands regulations. Additionally, all site-specific locations will be subject to an environmental review to help ensure environmental concerns are addressed. Potential wetlands impacts can be further reduced by implementing BMPs and mitigation measures (see Chapter 17).

Examples of activities that could have other direct effects to wetlands in New York include:

- *Vegetation Clearing*: removing existing vegetation by clearing forest and herbaceous vegetation during construction activities, grading, seeding, and mulching. Clearing and grading may include increased soil erosion and a decrease in the available habitat for wildlife.

- *Ground Disturbance*: Increased amounts of stormwater runoff in wetlands can alter water level response times, depths, and duration of water detention. Reduction of watershed infiltration capacity could cause wetland water depths to rise more rapidly following storm events.

- *Direct Soil Changes*: Changes in soil chemistry can lead to degradation of wetlands that have a specific pH range and/or other parameter, such as the acidic conditions of sphagnum bogs and alkaline conditions of calcareous fens (which are high quality wetlands in New York).

- *Water Quality Degradation* (spills or sedimentation): The loss of wetlands results in a depletion of water quality both in the wetland and downstream. Filtering of pollutants by wetlands is an important function and benefit. High levels of suspended solids (sedimentation) can reduce light penetration, dissolved oxygen, and overall wetland productivity. Toxic materials in runoff can interfere with the biological processes of wetland plants, resulting in impaired growth, mortality, and changes in plant communities.

Indirect Effects:[193] Change in Function(s)[194] or Change in Wetland Type

Indirect effects to wetlands could include change in wetland function or conversion of a resource to another type (i.e., wetland to an open body of water). The construction of curb and gutter systems could divert surface runoff and can cause flooding or wetlands to dry out, depending on the direction of diversion. Indirect effects to high- and low-quality wetlands would be less than significant given the amount of land disturbance associated with the project locations (generally less than an acre) and the short time-frame of deployment activities and the application of federal, state, and local wetlands regulations. Additionally, all site-specific locations will be subject to an environmental review to help ensure environmental concerns are addressed. Potential wetlands impacts can be further reduced by implementing BMPs and mitigation measures (see Chapter 17).

Examples of functions related to wetlands in New York that could potentially be impacted from construction-related deployment activities include:

- *Flood Attenuation*: Wetlands provide flood protection by holding excess runoff after storms, before slowly releasing it to surface waters. While wetlands may not prevent flooding, they can lower flood peaks by providing detention of storm flows.

- *Bank Stabilization*: By reducing the velocity and volume of flow, wetlands provide erosion control, floodwater retention, and reduce stream sedimentation.

[193] Indirect effects are those resulting from direct effects, but they occur elsewhere in space and/or time. Includes indirect hydrologic effects (wetting or drying) that in turn alters wetland function or type.

[194] Wetland functions include hydrologic, ecological, geomorphic, and social functions typically assessed for wetlands as part of USACE compensatory mitigation planning. Typical functions assessed may include flood attenuation, bank stabilization, water quality, organic matter input/transport, nutrient processing, wildlife habitat, T/E species habitat, biodiversity, recreational/social value.

- *Water Quality*: Water quality impacts on wetland soils can eventually threaten a wetland's existence. Where sediment inputs exceed rates of sediment export and soil consolidation, a wetland would gradually become filled.

- *Nutrient Processing*: Wetland forests retain ammonia during seasonal flooding. Wetlands absorb metals in the soils and by plant uptake via the roots. They also allow metabolism of oxygen-demanding materials and reduce fecal coliform populations. These pollutants are often then buried by newer plant material, isolating them in the sediments.

- *Wildlife Habitat*: Impacts on wetland hydrology and water quality affect wetland vegetation. While flooding can harm some wetland plant species, it promotes others. Shifts in plant communities because of hydrologic changes can have impacts on the preferred food supply and animal cover.

- *Recreational Value*: Wetlands provide recreation opportunities for people, such as hiking, bird watching, and photography.

- *Groundwater Recharge*: Wetlands retain water, allowing time for surface waters to infiltrate into soils and replenish groundwater.

According to the significance criteria defined in Table 11.2.5-1, impacts to lower quality wetlands (e.g., not rare or unique, that have low productivity and species diversity, and those that are already impaired or impacted by human activity), would be considered potentially less than significant. Since the majority of the 2 million acres of wetlands in New York are not considered high quality, deployment activities could have less than significant indirect impacts on wetlands in the state. BMPs and mitigation measures could be implemented, as feasible and practicable, to reduce potential impacts to all wetlands.

In areas such as the East-of-Hudson Watershed, where all wetlands are considered high quality, there could be potentially significant impacts impacts at the project level that would be analyzed on a case-by-case basis. If avoidance were not possible, BMPs and mitigation measures would help to mitigate impacts.

11.2.5.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities. To determine the magnitude of potential impacts of site-specific activities, wetland delineations could be required to determine the exact location of all wetlands, including high quality wetlands, as well as a functional assessment by an experienced wetland delineator.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to wetlands and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to potentially significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to wetlands under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to wetlands since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to wetlands because there would be no ground disturbance.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures, adding equipment to satellites being launched for other purposes, and the use of portable devices that use satellite technology is not likely to impact wetlands since there would be no ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact wetlands, it is anticipated that this activity would have no impact on wetlands.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to wetlands because of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct effects, other direct effects, and indirect effects on wetlands. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to wetlands include the following:

- Wired Projects

    - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to wetlands. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct and indirect impacts to wetlands. The amount of impact depends on the land area affected, installation technique, proximity to wetlands, and type of wetland that could be affected (e.g., high quality). Any ground disturbance could cause direct and indirect impacts wetlands, depending on the proximity to wetlands and type of wetlands that could be affected. Implementing BMPs and mitigation measures could reduce impact intensity.

    - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore or inland bodies of water would potentially impact wetlands found along shorelines. Additional project-specific environmental reviews would be required to assess potential impacts to wetland environments, including coastal and marine environments.

    - New Build – Aerial Fiber Optic Plant: Potential impacts would be similar to Buried Fiber Optic Plant. Any ground disturbance could cause direct and indirect impacts wetlands, depending on the proximity to wetlands and type of wetlands that could be affected.

    - Collocation on Existing Aerial Fiber Optic Plant: Any ground disturbance could cause direct and indirect impacts to wetlands from increased suspended solids and runoff from activities, depending on the proximity to wetlands and type of wetlands that could be affected.

    - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading or other ground disturbance to install small boxes or hunts, or access roads, there could potentially be direct and indirect impacts to wetlands. The amount of impact from a temporary increase in the amount of suspended solids running off construction sites and into wetlands, depends on the land area affected, installation technique, and location. If trenching were to occur near wetlands, it could cause impacts on wetlands. Implementing BMPs and mitigation measures could reduce impact intensity.

- Wireless Projects

    - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could potentially cause direct and indirect impacts to wetlands. The activities could cause a temporary increase in the amount of suspended solids running off construction sites and into wetlands, depending on their proximity. The amount of impact depends on the land area affected, installation technique, and proximity to wetlands, and wetland type. If trenching were to occur near wetlands, it could cause impacts on wetlands. Implementing BMPs and mitigation measures could reduce impact intensity.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in impacts to wetlands. However, if structural hardening, and physical security measures required ground disturbance, such as grading, or excavation activities, impacts to wetlands could occur near wetlands, it could cause impacts on wetlands. Implementing BMPs and mitigation measures could reduce impact intensity.

- Deployable Technologies: Implementation of deployable technologies could result in potential impacts to wetlands if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. The amount of impact depends on the land area affected, installation technique, and location. Implementing BMPs and mitigation measures could reduce impact intensity. The activities could also result in other direct impacts on wetlands if fuels leak into nearby waterbodies or wetlands. Deployment of drones, weather balloons, blimps, or piloted aircraft could have other direct impacts on wetlands if fuels spill or other chemicals seep into nearby waterbodies or wetlands.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or underwater cables; installation of security/safety lighting and fencing; and deployment of aerial platforms. Depending on the deployment activity for this infrastructure, potential impacts to wetlands may occur. The amount of impact depends on the land area affected, installation technique, proximity to wetlands, and type of wetland that could be affected (e.g., high quality). Any ground disturbance could cause direct and indirect impacts wetlands, depending on the proximity to wetlands and type of wetlands that could be affected. These impacts are expected to be less than significant. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to further avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there could be ongoing potential other direct impacts to wetlands if heavy equipment is used for routine operations and maintenance application of herbicides occurs to control vegetation along all rights-of-ways (ROWs) and near structures, depending on the proximity of wetlands. The intensity of the impact depends on the amount of herbicides used, frequency, and location of nearby sensitive wetlands. These impacts are not expected to be significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to further avoid or minimize potential impacts.

11.2.5.5 Alternatives Impact Assessment

The following section assesses potential impacts to water resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to wetlands as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to wetlands. Some staging or launching/landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct and indirect impacts to wetlands from a temporary increase in the amount of suspended solids running off construction sites to nearby surface waters. The amount of impact depends on the land area affected, installation technique, and proximity to wetlands, and wetland type; however, impacts are expected to be less than significant due to the small-scale and temporary duration of expected FirstNet deployment activities in any one location. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to further avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Deployable Technologies Alternative would consist of routine maintenance and inspection of the deployable technologies. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The wetlands impacts would depend on the watershed, duration (chronic or short-term) and frequency (many years or a few months) the resource would be used, and the wetland's quality and function.

It is anticipated that there would be less than significant impacts to wetlands associated with routine inspections of the Deployable Technologies Alternative. Site maintenance, including mowing or herbicides, is anticipated to result in less than significant effects to wetlands, depending on the proximity to, wetland type, and amount of herbicides used. In addition, the presence of new access roads could increase the overall amount of impervious surface in the area, and increase runoff effects on wetlands, as explained above. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to wetlands from construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.5, Wetlands.

11.2.6 Biological Resources

11.2.6.1 Definition of the Resource

This Chapter describes potential impacts to terrestrial vegetation, wildlife, fisheries and aquatic habitat, and threatened and endangered species in New York associated with deployment and operation of the Proposed Action and its Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.6.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on terrestrial vegetation, wildlife, fisheries, and aquatic habitats were evaluated using the significance criteria presented in Table 11.2.6-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to terrestrial vegetation, wildlife, and fisheries and aquatic habitat addressed in Sections 11.2.6.3, 11.2.6.4, and 11.2.6.5, respectively, are presented as a range of possible impacts.

Refer to Section 11.2.6.6 for impact assessment methodology and significance criterial associated with threatened and endangered species in New York.

11.2.6.3 Terrestrial Vegetation

Impacts to terrestrial vegetation occurring in New York are discussed in this section.

Description of Environmental Concerns

Direct Injury/Mortality

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are permanent or temporary loss or disturbance of individual plants. Based on the impact significance criteria presented in Table 11.2.6-1, direct injury or mortality impacts could be significant if population-level or sub-population effects were observed for at least one species depending on the distribution and the management of the subject species. Although unlikely, direct mortality/injury to plants could occur in construction zones from land clearing, excavation activities, or vehicle traffic; however, these events are expected to be relatively small in scale. The implementation of BMPs and mitigation measures and avoidance measures would help to minimize or altogether avoid potential impacts to plant population survival.

Vegetation and Habitat Loss, Alteration, or Fragmentation

Habitat impacts are primarily physical perturbations that result in alterations in the amount or quality of a habitat. As with all of the effects categories, the magnitude of the impact depends on the duration, location, and spatial scale of the system and associated activities. Habitat fragmentation is the loss or breaking down of continuous and connected habitat. Areas in near Long Island or the Great Lakes have experienced extensive land use changes from urbanization and agriculture. However, a large portion of the state is forested and remains relatively unfragmented, particularly in the Adirondacks and Catskills areas.

Construction of new infrastructure and long-term facility maintenance would result in the alteration of the type of vegetative communities in these localized areas, and in some instances the permanent loss of vegetation. Further, if proposed sites with sensitive or rare regional vegetative communities are unavoidable, BMPs and mitigation measures would be recommended to minimize or avoid potential impacts.

Table 11.2.6-1: Impact Significance Rating Criteria for Terrestrial Vegetation, Wildlife, Fisheries, and Aquatic Habitats

Type of Effect	Effect Characteristic	Impact Level: Potentially Significant	Impact Level: Less than Significant with BMPs and Mitigation Measures Incorporated	Impact Level: Less than Significant	Impact Level: No Impact
Direct Injury/Mortality	Magnitude or Intensity	Population-level or sub-population injury /mortality effects observed for at least one species depending on the distribution and the management of said species. Events that may impact endemics, or concentrations during breeding or migratory periods. Violation of various regulations including Marine Mammal Protection Act (MMPA), Magnuson Stevens Fishery Conservation And Management Act (MSFCMA), Migratory Bird Treaty Act (MBTA), and Bald and Golden Eagle Protection Act (BGEPA).	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant	Individual mortality observed but not sufficient to affect population or sub-population survival	No direct individual injury or mortality would be observed.
	Geographic Extent	Regional effects observed within New York for at least one species. Anthropogenic disturbances that lead to exclusion from nutritional or habitat resources, or direct injury or mortality of endemics or a significant portion of the population or sub-population located in a small area during a specific season.		Effects realized at one location when population is widely distributed, and not concentrated in affected area	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species.		Temporary, isolated, or short-term effects that are reversed within one to three years	NA

Type of Effect	Effect Characteristic	Impact Level: Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Vegetation and Habitat Loss, Alteration, or Fragmentation	Magnitude or Intensity	Population-level or sub-population effects observed for at least one species or vegetation cover type, depending on the distribution and the management of the subject species. Impacts to terrestrial, aquatic, or riparian habitat or other sensitive natural community vital for feeding, spawning/breeding, foraging, migratory rest stops, refugia, or cover from weather or predators. Violation of various regulations including MMPA, MSFCMA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant	Habitat alteration in locations not designated as vital or critical for any period. Temporary losses to individual plants within cover types, or small habitat alterations take place in important habitat that is widely distributed and there are no cover type losses or cumulative effects from additional projects	Sufficient habitat would remain functional to maintain viability of all species. No damage or loss of terrestrial, aquatic, or riparian habitat from project would occur
	Geographic Extent	Regional effects observed within New York for at least one species. Anthropogenic disturbances that lead to the loss or alteration of nutritional or habitat resources for endemics or a significant portion of the population or sub-population located in a small area during a specific season.		Effects realized at one location	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species		Temporary, isolated, or short-term effects that are reversed within one to three years	NA

Type of Effect	Effect Characteristic	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Indirect Injury/Mortality	Magnitude or Intensity	Population-level or sub-population effects observed for at least one species depending on the distribution and the management of said species. Exclusion from resources necessary for the survival of one or more species and one or more life stages. Anthropogenic disturbances that lead to mortality, disorientation, the avoidance or exclusion from nutritional or habitat resources for endemics or a significant portion of the population or sub-population located in a small area during a specific season. Violation of various regulations including MMPA, MSFCMA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant	Individual injury/mortality observed but not sufficient to affect population or sub-population survival. Partial exclusion from resources in locations not designated as vital or critical for any given species or life stage, or exclusion from resources that takes place in important habitat that is widely distributed. Anthropogenic disturbances are measurable but minimal as determined by individual behavior and propagation, and the potential for habituation or adaptability is high given time.	No stress or avoidance of feeding or important habitat areas. No reduced population resulting from habitat abandonment.
	Geographic Extent	Regional or site specific effects observed within New York for at least one species. Behavioral reactions to anthropogenic disturbances depend on the context, the time of year age, previous experience and activity. Anthropogenic disturbances that lead to startle responses of large groupings of individuals during haulouts, resulting in injury or mortality.		Effects realized at one location	NA

Type of Effect	Effect Characteristic	Impact Level: Potentially Significant	Impact Level: Less than Significant with BMPs and Mitigation Measures Incorporated	Impact Level: Less than Significant	Impact Level: No Impact
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species		Temporary, isolated, or short-term effects that are reversed within one to three years	NA
Effects to Migration or Migratory Patterns	Magnitude or Intensity	Population-level or sub-population effects observed for at least one species depending on the distribution and the management of said species. Temporary or long-term loss of migratory pattern/path or rest stops due to anthropogenic activities. Violation of various regulations including MMPA, MSFCMA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant	Temporary loss of migratory rest stops due to anthropogenic activities take place in important habitat that is widely distributed and there are no cumulative effects from additional projects	No alteration of migratory pathways, no stress or avoidance of migratory paths/patterns due to project
	Geographic Extent	Regional effects observed within New York for at least one species. Anthropogenic disturbances that lead to exclusion from nutritional or habitat resources during migration, or lead to changes of migratory routes for endemics or a significant portion of the population or sub-population located in a small area during a specific season.		Effects realized at one location when population is widely distributed, and not concentrated in affected area	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species		Temporary, isolated, or short-term effects that are reversed within one to three years	NA

Type of Effect	Effect Characteristic	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Reproductive Effects	Magnitude or Intensity	Population or sub-population level effects in reproduction and productivity over several breeding/spawning seasons for at least one species depending on the distribution and the management of said species. Violation of various regulations including MMPA, MSFCMA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Effects to productivity are at the individual rather than population level. Effects are within annual variances and not sufficient to affect population or sub-population survival.	No reduced breeding or spawning success
	Geographic Extent	Regional effects observed within New York for at least one species. Anthropogenic disturbances that lead to exclusion from prey or habitat resources required for breeding/spawning or stress, abandonment, and loss of productivity for endemics or a significant portion of the population or sub-population located in a small area during the breeding/spawning season.		Effects realized at one location	NA

Type of Effect	Effect Characteristic	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several breeding/spawning seasons for at least one species.		Temporary, isolated, or short-term effects that are reversed within one breeding season	NA
Invasive Species Effects	Magnitude or Intensity	Extensive increase in invasive species populations over several seasons	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Mortality observed in individual native species with no measurable increase in invasive species populations	No loss of forage and cover due to the invasion of exotic or invasive plants introduced to project sites from machinery or human activity.
	Geographic Extent	Regional impacts observed throughout New York		Effects realized at one location	NA
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons		Periodic, temporary, or short-term changes that are reversed over one or two seasons	NA

Indirect Injury/Mortality

Indirect effects are effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8[b]). Indirect injury/mortality can include stress related to disturbance. The alteration of soils or hydrology within a localized area can result in stress or mortality of plants. Construction activities that remove large quantities of soil in the immediate vicinity of trees could cause undue stress to trees from root exposure, although this is unlikely to occur due to the small size of expected FirstNet activities. Increasing or decreasing hydrology in an area could lead to moisture stress and/or mortality of plant species that are adapted to specific hydrologic regimes. Indirect injury/mortality impacts vary depending on the species, time of year and duration of construction or deployment, though BMPs and mitigation measures could help to minimize or avoid the potential impacts.

Effects to Migration or Migratory Patterns

No effects to the long-term migration or migratory patterns for terrestrial vegetation (e.g., forest migration) are expected as a result of the Proposed Action given the small-scale of deployment activities.

Reproductive Effects

No reproductive effects to terrestrial vegetation are expected as a result of the Proposed Action given the small-scale of deployment activities.

Invasive Species Effects

When human activity results in a species entering an ecosystem new to it, the species is classified as introduced or, depending on its ability to spread rapidly and outcompete native species, invasive. The introduction of invasive species can have a dramatic effect on natural resources and biodiversity. New York recently adopted regulations to regulate and prohibit “the possession, transport, importation, sale, purchase, and introduction of select invasive species,” both plants and animals (6 NYCRR Part 575), to help control invasive species with the greatest potential to impact the state’s biodiversity.

When non-native species are introduced into an ecosystem in which they did not evolve, their populations sometimes increase rapidly. Natural or native community species evolve together into an ecosystem with many checks and balances that limit the population growth of any one species. These checks and balances include such things as predators, herbivores, diseases, parasites, and other organisms competing for the same resources and limiting environmental factors. However, when an organism is introduced into an ecosystem in which it did not evolve naturally, those limits may not exist and its numbers can sometimes dramatically increase. The unnaturally large population numbers can then have severe impacts to the environment, local economy, and human health. Invasive species can out-compete the native species for food and habitats and sometimes even cause their extinction. At least six noxious weed species are known to occur within New York including three terrestrial, one aquatic, and two parasitic species

(USDA, 2015b). Even if natives are not completely eliminated, the ecosystem often becomes much less diverse (USFWS, 2012d).

The potential to introduce invasive plants within construction zones and during long-term site maintenance can occur from vehicles and equipment being transported from one region to another, or when conducting revegetation of a site after deployment activities are complete. BMPs could help to minimize or avoid the potential for introducing invasive plant species during implementation of the Proposed Action.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to terrestrial vegetation resources and others would not. In addition, the same type of Proposed Action Infrastructure could result in a range impacts, from no impacts to less than significant impacts, depending on the deployment scenario or site-specific conditions. The terrestrial vegetation that would be affected would depend on the ecoregion, the species' phenology[195], and the nature as well as the extent of the habitats affected.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to terrestrial vegetation under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Although terrestrial vegetation could be impacted, it is anticipated that effects to vegetation would be minimal since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to terrestrial vegetation because there would be no ground disturbance.

[195] Phenology is the seasonal changes in plant and animal lifecycles, such as emergence of insects or migration of birds.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures, attaching equipment to satellite launches for other purposes, and the use of portable devices that use satellite technology would not impact terrestrial vegetation because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact biological resources, it is anticipated that this activity would have no impact on terrestrial vegetation.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to terrestrial vegetation as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality; vegetation and habitat loss, alteration, or fragmentation; indirect injury/mortality; and invasive species effects. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to terrestrial vegetation include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to terrestrial vegetation. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects if BMPs and mitigation measures are not implemented.
  - New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilities to house outside plant equipment could result in potential impacts to terrestrial vegetation. Impacts may vary depending on the number or individual poles installed, but could include direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects if BMPs and mitigation measures are not implemented.
  - Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could result in direct or indirect injury to

plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore or inland bodies of water would not impact terrestrial vegetation. However, impacts to terrestrial vegetation could potentially occur as a result of the construction of landings and/or facilities on shore to accept submarine cables could potentially occur as a result of land clearing, excavation activities, and heavy equipment use. Effects could include direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects if BMPs and mitigation measures are not implemented.

- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, such disturbance could result in direct or indirect injury to plants, vegetation loss, and invasive species effects.

- Wireless Projects

  - New Wireless Communication Towers or Backhaul Equipment: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads), microwave facilities, or access roads could result in impacts to terrestrial vegetation. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower which would not result in impacts to terrestrial vegetation. However, if new power units, replacement towers, structural hardening, and physical security measures require land clearing or excavation activities, impacts would be similar to new wireless construction.

  - Deployable Technologies: Implementation of deployable technologies including COWs, COLTs, or SOWs could result in direct impacts to terrestrial vegetation if deployment occurs on vegetated areas, or the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects. Deployment of drones, weather balloons, blimps, or piloted aircraft could potentially impact terrestrial vegetation if launching or recovery occurs on vegetated areas. Impacts would be similar to deployment of COWs, COLTs, and SOWs.

In general, the abovementioned activities could potentially involve land/vegetation clearing; topsoil removal; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or cables; heavy equipment movement; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to terrestrial vegetation associated with deployment of this infrastructure, depending on their scale, could include direct or indirect injury/mortality to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species depending on the ecoregion, the species' phenology, and the nature and extent of the vegetation affected. These impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The terrestrial vegetation that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

It is anticipated that there would be no impacts to terrestrial vegetation associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Site maintenance, including mowing or herbicides, may result in less than significant effects to terrestrial vegetation from accidental spills from maintenance equipment or release of herbicides and because these areas would not be allowed to revert to a more natural state. If usage of heavy equipment or land clearing activities occurs off established roads or corridors as part of routine maintenance or inspections, direct or indirect injury/mortality to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species could occur to terrestrial vegetation, however impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to terrestrial vegetation associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to terrestrial vegetation as a result of implementation of this alternative could be as described below.

Deployment Impacts

As described above, implementation of deployable technologies could result in less than significant impacts from land/vegetation clearing, excavation, and paving activities. These activities could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects. Greater frequency and duration of deployments could change the magnitude of impacts. However, impacts are expected to remain less than significant due to the relatively small-scale of FirstNet activities at individual locations. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operational Impacts

As described above, operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be less than significant impacts to terrestrial vegetation associated with routine operations, management, and monitoring, due to the relatively small-scale of likely FirstNet project sites. The impacts can vary greatly among species, vegetative community, and geographic region, but are expected to be less than significant.

No Action Alternative

Under the No Action Alternative, the nationwide, interoperable, public safety broadband network would not be deployed; therefore there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to terrestrial vegetation as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.6.3, Terrestrial Vegetation.

11.2.6.4 Wildlife

Impacts to amphibians and reptiles, terrestrial mammals, marine mammals, birds, and terrestrial invertebrates occurring in New York and New York's near offshore environment (i.e., less than two miles from the edge of the coast) are discussed in this section.

Description of Environmental Concerns

Direct Injury/Mortality

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are entanglement, vehicle or vessel strike, problems associated with accidental ingestion, and injuries incurred by sensitive animals from disturbance events.

Based on the impact significance criteria presented in Table 11.2.6-1, less than significant impacts would be anticipated given the anticipated small size and nature of the majority of proposed deployment activities. Although anthropogenic disturbances may be measurable but minimal for some FirstNet projects, impacts to individual behavior of animals would be short-term and direct injury or mortality impacts at the population-level or sub-population effects would not likely be observed.

<u>Terrestrial Mammals</u>

Vehicle strikes are common sources of direct mortality or injury to both small and large mammals in New York. Mammals are attracted to roads for a variety of reasons including use as a source of minerals, preferred vegetation along roadways, areas of insect relief, and ease of travel along road corridors (USDOT, 2015d). Individual injury or mortality as a result of vehicle strikes associated with the Proposed Action could occur.

Entanglement in fences or other barriers could be a source of mortality or injury to terrestrial mammals, though entanglements would likely be isolated, individual events.

If bats, and particularly maternity colonies are present at a site location, removal of trees during land clearing activities could result in direct injury/mortality if bats are utilizing them as roost trees or for rearing young. The scale of this impact would be expected to be small-scale and would be dependent on the location and type of deployment activity, and the amount of tree removal. Site avoidance measures could be implemented to avoid disturbance to bats.

<u>Marine Mammals</u>

Marine mammals swimming or hauled out on land are sensitive to boats, aircraft, and human presence. Noises, smells, sounds, and sights may elicit a flight reaction. Trampling deaths associated with haulout disturbance are known source of mortality for seals but are not anticipated from likely FirstNet deployment activities.

Entanglements from marine debris as well as ingestion of marine debris could result in injury or death to marine mammals. Marine debris is any manmade object discarded, disposed of, or abandoned that enters the marine environment. Entanglements from marine debris are not anticipated from FirstNet activities.

Many of the whale species known to occur offshore of New York are also protected under the ESA. Environmental consequences pertaining to these whales are discussed in Section 11.2.6.6, Threatened and Endangered Species and Species of Conservation Concern.

Birds

Mortalities from collisions or electrocutions with manmade cables and wires are environmental concerns for avian species and violate MBTA and BGEPA. Generally, collision events occur to night-migrating birds, "poor" fliers (e.g., ducks), heavy birds (e.g., swans and cranes), and birds that fly in flocks; while species susceptible to electrocution are birds of prey, ravens, and thermal soarers, typically having large wing spans (Gehring, 2011).

Avian mortalities or injuries can also result from vehicle strikes, although typically occur as isolated events.

Direct injury and mortality of birds can occur to ground-nesting birds when nests are either disturbed or destroyed during land clearing, excavation and trenching, and other ground disturbing activities. Removal of trees during land clearing activities could also result in direct injury/mortality to forest dwelling birds if they are utilizing them as roost trees for resting or shelter from predators and inclement weather, or as nest trees for rearing young. The scale of this impact would be associated with the amount of tree removal and the abundance of forest-dwelling birds roosting/nesting in the area. These impacts could be particularly pronounced in IBAs within the state as these areas provide them with essential habitat that supports various life stages (Hill, 1997). Direct injury/mortality are not anticipated to be widespread or affect bird populations due to the small-scale of likely FirstNet actions.

Direct mortality and injury to birds of New York are not likely to be widespread or affect populations of species as a whole; individual species impacts may be realized depending on the nature of the deployment activity. If siting considerations, BMPs, and mitigation measures are implemented (Chapter 17), potential impacts could be minimized. Additionally, potential impacts under MBTA and BGEPA can be addressed through BMPs and mitigation measures developed in consultation with USFWS.

Reptiles and Amphibians

The majority of New York's amphibian and reptile species are widely distributed throughout New York. However, New York does serve as the northern, southern, or eastern limit for some native amphibians and reptiles. Direct mortality to amphibians or reptiles could occur in construction zones either by excavation activities or by vehicle strikes; however, these events are expected to be temporary and isolated, affecting only individual animals.

Six species of marine turtles – all listed as threatened or endangered under the ESA – occur in New York's offshore environment. Environmental consequences pertaining to these reptiles are discussed in Section 11.2.6.6, Threatened and Endangered Species and Species of Conservation Concern.

Terrestrial Invertebrates

The terrestrial invertebrate populations of New York are so widely distributed that injury/mortality events are not expected to affect populations of species as a whole.

Vegetation and Habitat Loss, Alteration, or Fragmentation

Habitat impacts are primarily physical perturbations that result in alterations in the amount or quality of a habitat. As with all of the effects categories, the magnitude of the impact depends on the duration, location, and spatial scale of the system and associated activities. Habitat fragmentation is the loss or breaking down of continuous and connected habitat, and impeding access to resources and mates. Areas in the Long Island or Great Lakes areas of New York have experienced extensive land use changes from urbanization and agriculture. However, a large portion of the state is forested and remains relatively unfragmented, particularly in the Adirondacks and Catskills areas.

Additionally, habitat loss can occur through exclusion, directly or indirectly, preventing an animal from accessing an optimal habitat (e.g., breeding, forage, or refuge), either by physically preventing use of a habitat or by causing an animal to avoid a habitat, either temporarily or long-term. It is expected that activities associated with the Proposed Action would cause exclusion effects only in very special circumstances, as in most cases an animal could fly, swim, or walk to a nearby area that would provide refuge.

Potential effects of vegetation and habitat loss, alteration, or fragmentation are described for New York’s wildlife species below.

<u>Terrestrial Mammals</u>

Mammals occupy a wide range of habitats throughout New York and may experience localized effects of habitat loss or fragmentation. Removal or loss of vegetation may impact large mammals (e.g., black bear, moose) by decreasing the availability of forest for cover from predators or foraging. Loss of cover may increase predation on both breeding adults as well as their young. The loss, alteration, or fragmentation of forested habitat would also impact some small mammals (e.g., bats, fisher, American marten) that utilize these areas for roosting, foraging, sheltering, and for rearing their young. Loss of habitat or exclusions from these areas could be avoided or minimized by BMPs and mitigation measures.

<u>Marine Mammals</u>

While a number of seal species may occur in the offshore areas of New York, sightings are rare with the exception of the harbor seal. Harbor seals tend to be non-migratory; they can be found in open waters and also using rocks, beaches or other coastal habitats as haulouts and pupping sites in New York, particularly in the Long Island area (NOAA, 2015m) (NYSDEC, 2015bf). Seals could be temporarily excluded from a resource or abandon their haulout locations due to the presence of humans, noise, or vessel traffic during deployment activities. For example, the seals would need to find a new haulout, likely at a less favorable location. Effects on seals from exclusion from resources would be low magnitude and temporary in duration.

Further, whales may be temporarily excluded from a resource if they avoid it due to the increased presence of boats, humans, and associated noise. Depending on the duration of response activities, minke whales could be excluded from their environment temporarily or could abandon the habitat entirely.

The degree to which habitat exclusion affects minke whales depends on many factors. Minke whales are mobile and are found in open water habitat in both coastal inshore and offshore oceanic environments; therefore, it is expected that activities would have only a minor and temporary effect on the ability of minke whales to access important resources. Loss of habitat or exclusions from these areas could be avoided or minimized by BMPs and mitigation measures as appropriated.

Loss of habitat or exclusions from these areas for seals and whales could be avoided or minimized by BMPs and mitigation measures (see Chapter 17). Environmental consequences pertaining to the endangered whales protected under the ESA are discussed in Section 3.2.6.6, Threatened and Endangered Species and Species of Conservation Concern.

Birds

The direct removal of most bird nests are prohibited under the MBTA. The USFWS and the NYSDEC can provide regional guidance on the most critical time periods (e.g., breeding season) to avoid vegetation clearing. The removal and loss of vegetation can affect avian species directly by loss of nesting, foraging, stopover, and cover habitat.

Noise disturbance and human activity, as discussed previously, could directly restrict birds from using their preferred resources. Greater human activity of longer duration would increase the likelihood that birds would avoid the area, possibly being excluded from essential resources. These impacts could be particularly pronounced if birds temporarily avoid IBAs within the state as these areas provide them with essential habitat that supports various life stages (Hill, 1997).

The degree to which habitat exclusion affects birds depends on many factors. The impact to passerine[196] species from disturbance or displacement from construction activities is likely to be short-term with minor effects from exclusion. Exclusion from resources concentrated in a small migratory stop area during peak migration can have major impacts to species that migrate in large flocks and concentrate at stop overs (e.g., shorebirds). BMPs and mitigation measures, including nest avoidance during construction-related activities, would help to avoid or minimize the potential impacts to birds from exclusion of resources, as appropriate.

Reptiles and Amphibians and Reptiles

Important habitats for New York's amphibians and reptiles typically consist of wetlands and, in some cases as with the timber rattlesnake, the surrounding upland forest. Impacts are expected to be less than significant. If proposed project sites were unable to avoid sensitive areas, BMPs and mitigation measures (see Chapter 17) would be implemented to avoid or minimize the potential impacts.

Filling or draining of wetland breeding habitat (see Section 11.2.4, Water Resources) and alterations to ground or surface water flow from development associated with the Proposed

[196]Passerines are an order of "perching" birds that have four toes, three facing forward and one backward, which allows the bird to easily cling to both horizontal and nearly vertical perches.

Action may also have effects to New York's amphibian and reptile populations, though BMPs and mitigation measures would help to avoid or minimize the potential impacts.[197]

Terrestrial Invertebrates

Habitat loss and degradation are the most common causes of invertebrate species' declines; however, habitat for many common terrestrial invertebrates is generally assumed to be abundant and widely distributed across the state, therefore no significant effects to terrestrial invertebrates are expected. Impacts to sensitive invertebrate species are discussed below in Section 11.2.6.6, Threatened and Endangered Species and Species of Concern.

Indirect Injury/Mortality

Indirect injury/mortality impacts vary depending on the species, time of year and duration of deployment, though BMPs and mitigation measures would help to avoid or minimize the potential impacts.

Terrestrial Mammals

Stress from repeated disturbances during critical time periods (e.g., roosting and mating) can reduce the overall fitness and productivity of young and adult terrestrial mammals. Indirect effects could occur result to roosting bats from noise, light, or human disturbance causing them to leave their roosting locations or excluding them from their summer roosting/maternity colony roosts. For example, some bat species establish summer roosting or maternity colonies in the same general area that they return to year and after year. The majority of FirstNet deployment activities would be short-term in nature; therefore, repeated disturbances would not occur. Depending on the project type and location, individual species may be disturbed resulting in less than significant impacts.

Marine Mammals

Repeated disturbance (e.g., from vessel traffic), especially near haulouts, can cause stress to individuals resulting in lower fitness and productivity. Given that the majority of FirstNet deployment activities are not expected to be located onshore or in the oceanic environment, less than significant impacts to no impacts would be anticipated for marine mammals.

Birds

Repeated disturbance, especially during the breeding and nesting season, can cause stress to individuals lowering fitness and productivity. These impacts could be particularly pronounced in IBAs within the state if birds temporarily avoid those areas, since they provide essential habitat for various life stages (Hill, 1997). The majority of FirstNet deployment activities would be short-term in nature; therefore, repeated disturbances would not occur. Depending on the project type and location, individual species may be disturbed resulting in less than significant impacts.

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[197] See Section 11.2.5, Wetlands, for a discussion of BMPs for wetlands.

Reptiles and Amphibians

Changes in water quality and quantity, especially during the breeding seasons, can cause stress resulting in lower productivity. The majority of FirstNet deployment activities would be short-term in nature; therefore, repeated disturbances would not occur. Depending on the project type and location, individual species may be disturbed resulting in less than significant impacts.

Terrestrial Invertebrates

Terrestrial invertebrates can experience chronic stress, either by changes in habitat composition or competition for resources, resulting in lower productivity. Due to the large number of invertebrates distributed throughout the state, and given the short-term nature of most of the deployment activities, this impact would likely be less than significant.

Effects to Migration or Migratory Patterns

Migration is the regular movement of animals from one region to another and back again. Migratory patterns vary by species and sometimes within the same species. Potential effects to migration patterns of New York's amphibians and reptiles, terrestrial mammals, marine mammals, birds, and terrestrial invertebrates are described below.

Terrestrial Mammals

Large game animals (e.g., moose) have well-defined migratory routes. Route knowledge is passed on from one generation to the next and includes important feeding and calving areas. Small mammals (e.g., bats) also have migratory routes that include spring and fall roosting areas between their summer maternity roosts and hibernacula.

Any clearance, drilling, and construction activities needed for network deployment, including noise associated with these activities, has the potential to divert mammals from these migratory routes. Impacts can vary depending on the species, time of year of construction/operation, and duration, but are generally expected to be less than significant. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Marine Mammals

Noise associated with the installation of cables in the near/offshore waters of coastal New York could impact marine mammal migration patterns, though impacts are likely to be short-term provided the noise sources are not wide ranging and below Level A and B sound exposure thresholds[198]. It is clear that behavioral responses are strongly affected by the context of exposure and by the animal's experience, motivation, and conditioning. Marine mammals have the capacity to divert from sound sources during migration, though BMPs and mitigation measures could help to avoid or minimize the potential impacts.

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[198] Level A: 190 dB re 1µPa (rms) for seals and 180 dB re 1µPa (rms) for whales, dolphins, and porpoises. It is the minimum exposure criterion for injury at the level at which a single exposure is estimated to cause onset of permanent hearing loss. Level B: 160 dB re 1µPa (rms). It is defined as the onset of significant behavioral disturbance is proposed to occur at the lowest level of noise exposure that has a measurable transient effect on hearing. (Southall, et al., 2007)

Birds

Because many birds have extremely long migrations, protection efforts for critical sites along migratory routes must be coordinated over vast distances often involving many different countries. For example, as a group, shorebirds migrating though New York undertake some of the longest-distance migrations of all animals. New York is located within the Atlantic Flyway, which spans more than 3,000 miles from the Arctic tundra to the Caribbean. New York has 123 IBAs, with the Catskill and Adirondack Mountain regions as well as the Finger Lakes, Hudson River Valley, and Long Island areas serving as important stopover areas for migratory birds (National Audubon Society, Inc., 2015b). Many migratory routes are passed from one generation to the next. Impacts can vary (e.g., mortality of individuals or abandonment of stopover sites by whole flocks) depending on the species, time of year of construction/operation, and duration, and impacts are expected to be less than significant. BMPs and mitigation measures could help to further avoid or minimize effects to migratory pathways.

Reptiles and Amphibians

Several species of mole salamanders and the wood frog are known to seasonally migrate in New York. These amphibians often travel by the hundreds on their migration pathway that often crosses roadways. Mole salamanders are typically found in burrows in the forest floor. Wood frogs use diverse vegetation types from grassy meadows to open forests. After they emerge from dormancy, wood frogs migrate up 900 feet to breeding pools, where they breed rapidly in early spring in permanent or ephemeral water (Homan, Atwood, Dunkle, & Karr, 2010). However, a report found that a small percentage of juvenile wood frogs could migrate over 1.5 miles from natal ponds, suggesting juveniles may be capable of migrating relatively long distances (Berven & Grudzien, 1990). In New York, the mole salamanders and wood frog are known to migrate up to 0.25 mile. Mortality and barriers to movement could occur as result of the Proposed Action (Calhoun & deMaynadier, 2007).

Species that use streams as dispersal or migratory corridors may be impacted if these waterways are restricted or altered, but and impacts are expected to be less than significant. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Terrestrial Invertebrates

The proposed deployment activities would be expected to be short-term or temporary in nature. No effects to migratory patterns of New York's terrestrial invertebrates are expected as a result of the Proposed Action.

Reproductive Effects

Reproductive effects are considered those that either directly or indirectly reduce an animal's ability to produce offspring or reduce the rates of growth, maturation, and survival of offspring, which can affect the overall population of individuals.

Terrestrial Mammals

Restricted access to important winter hibernacula or summer maternity roosts for bats and calving grounds for large mammals, such as the moose, has the potential to negatively affect body condition and reproductive success of mammals in New York. For example, moose use certain types of habitats that allow for more effective defense of their calves from predators.

Disturbance from deployment and operations could also result in the abandonment of offspring leading to reduced survival, although these activities are expected to be small-scale and impacts are expected to be less than significant. Reproductive effects as a result of displacement and disturbance could be minimized through the use of BMPs and mitigation measures.

Marine Mammals

Restricted access to important calving grounds has the potential to negatively affect body condition and reproductive success of marine mammals in New York. For example, the displacement of female seals from preferred pupping habitats due to deployment and operations may reduce fitness and survival of pups potentially affecting overall productivity, though activities are likely to be small-scale in nature and contribute only minimally to minor, short-term displacement, and BMPs and mitigation measures could help to avoid or minimize the potential impacts.

Disturbance to hauled out seals from activities associated with the Proposed Action could result in the abandonment, or death of offspring, though BMPs and mitigation measures would help to avoid or minimize the potential impacts.

Birds

Impacts due to Proposed Action deployment and operations could include abandonment of the area and nests due to disturbance. Disturbance (visual and noise) may displace birds into less suitable habitat and thus reduce survival and reproduction. These impacts could be particularly pronounced in IBAs within the state if birds temporarily avoid those areas, since they provide essential habitat for various life stages (Hill, 1997). The majority of FirstNet deployment or operation activities are likely to be small-scale in nature. BMPs and mitigation measures as defined through consultation with USFWS, if required, could help to avoid or minimize any potential impacts.

Reptiles and Amphibians

Reproductive effects to reptile nests may occur through direct loss or disturbance of nests. For example, the spotted turtle (*Clemmys guttata*) leaves its breeding pool in May and travels to its nesting site.

Reproductive effects to sub-populations of amphibians and reptiles may occur through the direct loss of vernal pools as breeding habitat if deployment activities occur near breeding pools, alter water quality through sediment infiltration, or obstruction of natural water flow to pools, though BMPs would help to avoid or minimize the potential impacts.

Terrestrial Invertebrates

The majority of FirstNet deployment or operation activities are likely to be short-term in nature; no reproductive effects to terrestrial invertebrates are expected as a result of the Proposed Action.

Invasive Species Effects

When human activity results in a species entering an ecosystem new to it, the species is classified as introduced or invasive. The introduction of invasive species can have a dramatic effect on natural resources. New York recently adopted regulations to regulate and prohibit “the possession, transport, importation, sale, purchase, and introduction of select invasive species” (6 NYCRR Part 575), which includes birds, amphibians, mammals, and terrestrial invertebrates, to help control invasive species with the greatest potential to impact the state’s biodiversity.

FirstNet deployment or operation activities could result in short-term or temporary changes to specific project sites; although these sites are expected to return to their natural state in a year or two. Invasive species are not expected to be introduced to project sites as part of the deployment activities from machinery or construction workers.

Potential invasive species effects to New York’s wildlife are described below.

Terrestrial Mammals

In New York, Eurasian boars adversely impact several native large and small mammals, including bear, turkey, waterfowl, and deer (NYSDEC, 2015bk). FirstNet deployment activities are not expected to introduce terrestrial mammal species to project sites as these activities are temporary and would not provide a mechanism for transport of invasive terrestrial mammals to project sites from other locations. Invasive species effects to terrestrial mammals could be minimized following BMPs in Chapter 17 to reduce the introduction potential from heavy equipment or laborers.

Marine Mammals

Invasive species displace native fauna and flora communities and/or radically change the nature of the habitats they invade. They also compete for the same natural resources and life requirements (i.e., food, space, and shelter) as native species and degrade local ecologies by disrupting the food chain, thereby causing the extinction of native species. Proposed FirstNet deployment activities near water would likely occur onshore with limited activities in the water; therefore, the introduction of non-native marine mammal species would not occur.

Birds

Invasive plant and pest species directly alter the landscape or habitat to a condition that is more favorable for an invasive species and less favorable for native species and their habitats. For example, in New York, mute swans can impact native waterfowl and wetland birds causing nest abandonment or impacts to rearing young due to their aggressive behavior. Further, this invasive bird can lead to declines in water quality from increased fecal coliform loading in the water, and declines in submerged aquatic vegetation that support native fish and other wildlife (Swift et al. 2013). FirstNet deployment activities could result in short-term or temporary changes to specific project sites; these sites are expected to return to their natural state in a year or two. Invasive bird species are not expected to be introduced at project sites as part of the deployment activities.

Reptiles and Amphibians

The red-eared slider (*Trachemys scripta elegans*) (a turtle species) and African clawed frog (*Xenopus laevis*) are regulated in New York under the 6 NYCRR Part 575. Both of these species are highly adaptable and can threaten native wildlife by competing with them for food sources and also spread disease. Proposed FirstNet deployment activities near water would likely occur onshore with limited activities in the water; therefore, the introduction of non-native species would be limited. Invasive terrestrial reptile or amphibian species are not expected to be introduced at project sites from machinery or laborers.

Terrestrial Invertebrates

Terrestrial invertebrate populations are susceptible to invasive plant species that may change or alter the community composition of specific plants on which they depend. Effects from invasive plant species to terrestrial invertebrates would be similar to those described for habitat loss and degradation.

Invasive insects in particular pose a large threat to New York's forest and agricultural resources. Species such as the gypsy moth (*Lymantria dispar dispar*), hemlock woolly adelgid (*Adelges tsugae*), Asian longhorned beetle (*Anoplophora glabripennis*), and emerald ash borer (*Agrilus planipennis*) are of particular concern in New York and are known to cause irreversible damage to native forests. The potential to introduce invasive invertebrates within construction zones and during long-term site maintenance can occur from vehicles and equipment being transported from one region to another, or when conducting revegetation of a site after deployment activities are complete. BMPs and mitigation measures would help to avoid or minimize the potential for introducing invasive plant species during implementation of the Proposed Action. Invasive species effects related to terrestrial invertebrates are minimized following the BMPs and mitigation measures described below.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to wildlife resources and others would not. In addition, and as described in this section, infrastructure developed under the Preferred Alternative could result in a range of impacts, from no impacts to less than significant impacts, depending on the deployment scenario or site-specific conditions. The wildlife that would be affected would depend on the ecoregion, the species' phenology and the nature and extent of the habitats affected.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 11.2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to wildlife resources under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Noise generated by equipment required to install fiber would be infrequent and of short duration, and unlikely to produce measurable changes in wildlife behavior. It is anticipated that effects to wildlife would be temporary and would not result in any perceptible change.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to wildlife resources because there would be no ground disturbance.
- Satellites and Other Technologies
  - It is anticipated that the installation of permanent equipment on existing structures, attaching equipment to satellites launched for other purposes, and the use of portable devices that use satellite technology would not impact wildlife because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact wildlife resources, it is anticipated that this activity would have no impact on wildlife resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to wildlife resources as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality; vegetation and habitat loss, alteration, or fragmentation; effects to migratory patterns; indirect injury/mortality; reproductive effects; and invasive species effects. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to wildlife resources include the following:

- Wired Projects

  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to wildlife resources. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct injury/mortalities of wildlife that are not mobile enough to avoid construction activities (e.g. reptiles, small mammals, and young individuals), that utilize burrows (e.g., ground squirrels), or that are defending nest sites (such as ground-nesting birds). Disturbance, including noise, associated with the above activities involving heavy equipment or land clearing could result in habitat loss, effects to migration patterns, indirect injury/mortality, reproductive effects, and invasive species effects if BMPs and mitigation measures are not implemented.

  - New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilitates to house outside plant equipment could result in potential impacts to wildlife resources. Impacts may vary depending on the number or individual poles installed and the extent of ground disturbance, but could include direct injury/mortality of individual species as described above; habitat loss, alteration, or fragmentation; effects to migratory patterns; indirect injury/mortality; and invasive species effects.

  - Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could result in direct injury/mortality, habitat loss or alteration, effects to migratory patterns, indirect injury/mortality, and invasive species effects. Noise disturbance from heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in migratory effects and indirect injury/mortality.

  - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore or inland bodies of water and construction of landings and/or facilities on the shore to accept submarine cables could potentially impact wildlife, marine mammals in particular (see Section 3.2.4, Water Resources, for a discussion of potential impacts to water resources). Potential effects could include direct injury/mortality, habitat loss, alteration, or fragmentation depending on the site location. If activities occurred during critical time periods, effects to migratory patterns as well as reproductive effects and indirect injury/mortality could occur.

  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, such disturbance could result in direct injury/mortality of wildlife as described for other New Build activities. Habitat loss, alteration and fragmentation;

effects to migration or migratory patterns, indirect injury/mortality, and invasive species effects could occur as a result of construction and resulting disturbance.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (e.g., generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to wildlife resources. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads could result in direct injury/mortality, habitat loss, alteration or fragmentation, and effects to migratory patterns. Security lighting and fencing could result in direct and indirect injury or mortality, effects to migratory patterns, as well as reproductive effects. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in impacts to wildlife. However, if new power units, replacement towers, or structural hardening are required, impacts would be similar to new wireless construction. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
  - Deployable Technologies: Implementation of deployable technologies including COWs, COLTs, or SOWs could result in direct injury/mortalities to wildlife on roadways from vehicular movement. If external generators are used, noise disturbance could potentially impact migratory patterns of wildlife. RF hazards could result in indirect injury or mortality as well as reproductive effects depending on duration and magnitude of operations. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Deployment of drones, balloons, blimps, aerostats, or piloted aircraft could potentially impact wildlife by direct or indirect injury/mortality from collision, entanglement or ingestion and effects to migratory patterns and reproductive effects from disturbance and/or displacement due to noise. The magnitude of these effects depends on the timing and frequency of deployments. However, deployment activities are expected to be temporary and isolated, and likely affecting only a small number of wildlife.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers or poles; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to wildlife resources associated with deployment of this infrastructure are anticipated to be less than significant given the small-scale of likely individual FirstNet projects; however, some deployment activities could include direct injury/mortality, habitat loss, indirect injury/mortality, effects to migration, reproductive effects, and effects of invasive species depending on the project type, location, ecoregion, the species' phenology, and the nature and extent of the habitats affected. As stated above, these impacts would likely be limited to individual wildlife species and unlikely to cause population-level impacts. The specific deployment activity and where the deployment will take place will be determined based on location-specific conditions and the results of site-specific environmental reviews. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The wildlife that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

It is anticipated that there would be less than significant impacts to wildlife resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Site maintenance would be infrequent, including mowing or limited application of herbicides, which may result in less than significant effects to wildlife including direct injury/mortality to less mobile wildlife, or exposure to contaminants from accidental spills from maintenance equipment or release of pesticides.

During operations, direct injury/mortality of wildlife could occur from collisions and/or entanglements with transmission lines, towers, and aerial platforms.

Wildlife resources could still be affected by the reduction in habitat quality associated with habitat fragmentation from the presence of access roads, transmission corridors, and support facilities. These features could also continue to disrupt movements of terrestrial wildlife, particularly during migrations between winter and summer ranges or in calving areas.

In addition, the presence of new access roads and transmission line ROWs may increase human use of the surrounding areas, which could increase disturbance to wildlife resulting in effects to migratory pathways, indirect injury/mortalities, reproductive effects, as well as the potential introduction and spread of invasive species as explained above. As stated above, these impacts would likely be limited to individual wildlife species and unlikely to cause population-level impacts. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to wildlife resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to wildlife resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As described above, implementation of deployable technologies could result in less than significant impacts from direct and indirect injury or mortality events, changes in migratory patterns, disturbance, or displacement. Greater frequency and duration of deployments could change the magnitude of impacts depending on species, life history, and region of the state. However, impacts are expected to remain less than significant because deployment activities are expected to be temporary, likely affecting only a small number of wildlife. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operational Impacts

As described above, operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be less than significant impacts. The impacts can vary greatly among species and geographic region. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the nationwide, interoperable, public safety broadband network would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to wildlife resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.6.4, Terrestrial Wildlife.

11.2.6.5 Fisheries and Aquatic Habitats

Impacts to fisheries and aquatic habitats occurring in New York and New York's near offshore environment are discussed in this section.

Description of Environmental Concerns

Direct Injury/Mortality

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are entanglement, vessel strike, problems associated with accidental ingestion, and injuries incurred by sensitive animals from disturbance events (USEPA, 2012h).

Based on the impact significance criteria presented in Table 11.2.6-1, less than significant impacts would be anticipated given the size and nature of the majority of proposed deployment activities. Although anthropogenic disturbances may be measurable (although minimal) for some FirstNet projects, individual behavior of fish species would be short-term and direct injury or mortality impacts at the population-level or sub-population effects would not likely be observed.

BMPs and mitigation measures could help to avoid or minimize potential impacts to fisheries and aquatic invertebrate population survival.

Vegetation and Habitat Loss, Alteration, or Fragmentation

Habitat impacts are primarily physical perturbations that result in alterations in the amount or quality of a habitat. As with all of the effects categories, the magnitude of the impact depends on the duration, location, and spatial scale of the system and associated activities. Habitat fragmentation is the breaking down of continuous and connected habitat, and impeding access to resources and mates.

Depending on the location, construction of new infrastructure and long-term facility maintenance could result in the shoreline habitat alteration in localized areas; in some instances, the permanent loss of riparian vegetation could occur, which could lead to water quality impacts and in turn aquatic habitat alteration. Habitat loss is not likely to be widespread or affect populations of species as a whole; fish species would be expected to swim to a nearby location, depending on the nature of the deployment activity. Additionally, deployment activities with the potential for impacts under the MSFCMA or other sensitive aquatic habitats can be addressed through BMPs and mitigation measures.

Indirect Injury/Mortality

Water quality impacts from exposure to contaminants from accidental spills from vehicles and equipment, and erosion or sedimentation from land clearing and excavation activities near or within riparian areas, floodplains, wetlands, streams, and other aquatic habitats could result in changes to habitat, food sources, or prey resulting in indirect mortality/ injury to fish and aquatic invertebrates. Indirect injury/mortality impacts vary depending on the species, time of year, and duration of deployment. These impacts are expected to be less than significant, and BMPs and mitigation measures to protect water resources (see Section 11.2.4, Water Resources) could help to minimize or avoid potential impacts.

Effects to Migration or Migratory Patterns

Migration is the regular movement of animals from one region to another and back again. Migratory patterns vary by species and sometimes within the same species. For example, restrictions or alterations to waterways could alter migration patterns, limit fish passage, or affect foraging and spawning site access. Impacts are expected to be less than significant, and are anticipated to be localized and at a small-scale, and would vary depending on the species, time of year, and duration of deployment. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Reproductive Effects

Reproductive effects are considered those that either directly or indirectly reduce an animal's ability to produce offspring or reduce the rates of growth, maturation, and survival of offspring, which can affect the overall population of individuals. Restrictions to spawning/breeding areas for fish and aquatic invertebrates and the alteration of water quality through sediment infiltration, obstruction of natural water flow, or loss of submerged vegetation resulting from the deployment of various types of infrastructure are expected to be less than significant, though BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Invasive Species Effects

The potential to introduce invasive plants within construction zones can occur from vehicles and equipment being transported from one region to another, or when conducting revegetation of a site after deployment activities are complete. FirstNet deployment activities could result in short-term or temporary changes to specific project sites and these sites are expected to return to their natural state in a year or two. Invasive species are not expected to be introduced to project sites as part of the deployment activities from machinery or construction workers, therefore impacts are expected to be less than significant. BMPs and mitigation measures could help to avoid or minimize the potential for introducing invasive aquatic plant and animal species during implementation of the Proposed Action.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to fisheries and aquatic habitats and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. The fisheries and aquatic habitats that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to fisheries and aquatic habitats under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance, including noise, associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that effects to wildlife would be temporary and would not result in any perceptible change.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to fisheries and aquatic habitats because there would be no ground disturbance.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact fisheries and aquatic habitats because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact fisheries, it is anticipated that this activity would have no impact on the aquatic environment.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to fisheries and aquatic habitats as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality; vegetation and habitat loss, alteration, or fragmentation; effects to migratory patterns; indirect injury/mortality; reproductive effects; and invasive species effects. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to fisheries and aquatic habitats include the following:

- Wired Projects

  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to fisheries and aquatic habitats. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities, particularly if they occur adjacent to water resources that support fish, could result in habitat loss, alteration and fragmentation; indirect injury/mortality; and invasive species effects if BMPs and mitigation measures are not implemented.

  - New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilitates to house outside plant equipment could result in potential impacts to fisheries and aquatic habitats if activities occur near water resources that support fish. Impacts may vary depending on the number or individual poles installed or if access roads or stream crossings are needed, but could include habitat loss, alteration and fragmentation; indirect injury/mortality; and invasive species effects.

  - Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could, if conducted near water resources that support fish, result in habitat loss, alteration and fragmentation; indirect injury/mortality; and invasive species effects.

  - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water and construction of landings and/or facilities on the shore to accept submarine cables could result in direct injury/mortalities of fisheries and aquatic invertebrates that are not mobile enough to avoid construction activities (e.g. mussels), that utilize burrows (e.g., crayfish), or that are defending nest sites (some fish). Disturbance, including noise, associated with the above activities could result in habitat loss, effects to migration patterns, indirect injury/mortality, reproductive effects, and invasive species effects if BMPs are not implemented.

  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, particularly near water resources that support fish, such disturbance could result in habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to fisheries and aquatic habitats, if such actions were deployed near water resrouces. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads, particularly if they occur near waterbodies, could result in habitat loss or indirect injury/mortality, and invasive species effects, although highly unlikely. Refer to Section 2.4, Radio Frequency Emissions, for more information on RF emissions.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower which would not result in impacts to fisheries and aquatic habitats. However, if new power units, replacement towers, or structural hardening are required, impacts would be similar to new wireless construction. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

- Deployable Technologies: Implementation of deployable technologies including COWs, COLTs, or SOWs could result in habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects if new access roads or other ground disturbing activities are necessary that generate erosion, sedimentation, or water quality impacts. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Deployment of drones, balloons, blimps, or piloted aircraft could potentially impact fisheries and aquatic habitat if deployment occurs within or adjacent to water resources. The magnitude of these effects depends on the timing and frequency of deployments, and could result in result in habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or underwater cables; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to fisheries and aquatic habitats associated with deployment of this infrastructure could include direct injury/mortality, habitat loss, indirect injury/mortality, effects to migration, reproductive effects, and effects of invasive species depending on the ecoregion, the species' phenology, and the nature and extent of the habitats affected. These impacts are anticipated to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The fisheries and aquatic habitats that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

It is anticipated that there would be less than significant impacts to fisheries and aquatic habitats associated with routine inspections of the Preferred Alternative. Site maintenance, if conducted near water resources that support fish, including application of herbicides, may result in less than significant effects to fisheries and aquatic habitats including exposure to contaminants from accidental spills from maintenance equipment or release of pesticides.

Fisheries and aquatic invertebrates could still be affected by the reduction in habitat quality associated with habitat fragmentation from the presence of access roads, transmission corridors, and support facilities. These features could also continue to disrupt movements of fish passage. In addition, the presence of new access roads and transmission line ROWs near water resources that support fish may increase human use of the surrounding areas, which could increase disturbance to fisheries and aquatic habitats resulting in effects to migratory pathways, indirect injury/mortalities, reproductive effects, as well as the potential introduction and spread of invasive species as explained above. Fisheries and aquatic habitat may also be impacted if increased access leads to an increase in the legal or illegal take of biota. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to fisheries and aquatic habitats associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to fisheries and aquatic habitats as a result of implementation of this alternative could be as described below.

<u>Deployment Impacts</u>

As explained above, implementation of deployable technologies could result in less than significant impacts from habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects. Greater frequency and duration of deployments could change the magnitude of impacts depending on species, life history, and region of the state. However, impacts are expected to remain less than significant. See Chapter 17, BMPs and Mitigation

Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operational Impacts

Operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be less than significant impacts to fisheries and aquatic habitats associated with routine operations, management, and monitoring. The impacts can vary greatly among species and geographic region. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the nationwide, interoperable, public safety broadband network would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to fisheries and aquatic habitats as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.6.5, Fisheries and Aquatic Habitats.

11.2.6.6 Threatened and Endangered Species and Species of Conservation Concern

This section describes potential impacts to threatened and endangered species in New York and New York's offshore environment associated with construction/deployment and operation of the Proposed Action and Alternatives. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on threatened and endangered species and their habitat were evaluated using the significance criteria presented in Table 11.2.6-2. The categories of impacts for threatened and endangered species and their habitats are defined as may affect, likely to adversely affect; may affect, not likely to adversely affect; and no effect. Characteristics of each effect type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes across the state, the potential impacts to threatened and endangered species addressed below are presented as a range of possible impacts.

Table 11.2.6-2: Impact Significance Rating Criteria for Threatened and Endangered Species

Type of Effect	Effect Characteristic	Impact Level		
		May Affect, Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**	**No Effect**
Injury/Mortality of a Listed Species	Magnitude or Intensity	As per the ESA, this impact threshold applies at the individual level so applies to any mortality of a listed species and any impact that has more than a negligible potential to result in unpermitted take of an individual of a listed species. Excludes permitted take.	Does not apply in the case of mortality (any mortality unless related to authorized take falls under likely to adversely affect category). Applies to a negligible injury that does not meet the threshold of take due to its low level of effect and/or ability to fully mitigate the effect. Includes permitted take.	No measurable effects on listed species
	Geographic Extent	Any geographic extent of mortality or any extent of injury that could result in take of a listed species	Any geographic extent that does not meet the threshold of take due to its low level of effect and/or ability to fully mitigate the effect. Typically applies to one or very few locations.	
	Duration or Frequency	Any duration or frequency that could result in take of a listed species	Any duration or frequency that does not meet the threshold of take due to its low level of effect and/or ability to fully mitigate the effect. Typically applies to infrequent, temporary, and short-term effects.	
Reproductive Effects	Magnitude or Intensity	Any reduction in breeding success of a listed species	Changes in breeding behavior (e.g., minor change in breeding timing or location) that are not expected to result in reduced reproductive success.	No measurable effects on listed species
	Geographic Extent	Reduced breeding success of a listed species at any geographic extent	Changes in breeding behavior at any geographic extent that are not expected to result in reduced reproductive success of listed species. Typically applies to one or very few locations.	
	Duration or Frequency	Any duration or frequency that could result in reduced breeding success of a listed species	Infrequent, temporary, or short-term changes in breeding behavior that do not reduce breeding success of a listed species within a breeding season.	

Type of Effect	Effect Characteristic	Impact Level		
		May Affect, Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**	**No Effect**
Behavioral Changes	Magnitude or Intensity	Disruption of normal behavior patterns (e.g., breeding, feeding, or sheltering) that could result in take of a listed species	Minor behavioral changes that would not result in take of a listed species.	No measurable effects on listed species
	Geographic Extent	Any geographic extent that could result in take of a listed species	Changes in behavior at any geographic scale that are not expected to result in take of a listed species. Typically applies to one or very few locations.	
	Duration or Frequency	Any duration or frequency that could result in take of a listed species	Infrequent, temporary, or short-term changes that are not expected to result in take of a listed species.	
Loss or Degradation of Designated Critical Habitat	Magnitude or Intensity	Effects to any of the essential features of designated critical habitat that would diminish the value of the habitat for the survival and recovery of the listed species for which the habitat was designated	Effects to designated critical habitat that would not diminish the functions or values of the habitat for the species for which the habitat was designated.	No measurable effects on designated critical habitat
	Geographic Extent	Effects to designated critical habitat at any geographic extent that would diminish the value of the habitat for listed species. Note that the likely to adversely affect threshold for geographic extent depends on the nature of the effect. Some effects could occur at a large scale but still not appreciably diminish the habitat function or value for a listed species. Other effects could occur at a very small geographic scale but have a large adverse effect on habitat value for a listed species.	Effects realized at any geographic extent that would not diminish the functions and values of the habitat for which the habitat was designated. Typically applies to one or few locations within a designated critical habitat.	
	Duration or Frequency	Any duration or frequency that could result in reduction in critical habitat function or value for a listed species.	Any duration or frequency that would not diminish the functions and values of the habitat for which the habitat was designated. Typically applies to Infrequent, temporary, or short-term changes.	

Description of Environmental Concerns

Injury/Mortality of a Listed Species

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are entanglement, vehicle strike, problems associated with accidental ingestion, and injuries incurred by sensitive animals from disturbance events.

Based on the impact significance criteria presented in Table 11.2.6-2, any direct injury or mortality of a listed species at the individual-level could be potentially significant as well as any impact that has more than a negligible potential to result in unpermitted take of an individual species at any geographic extent, duration, or frequency. Direct injury/mortality environmental concerns pertaining to federally listed terrestrial mammals, birds, reptiles, invertebrates, and plants with known occurrence in New York are described below.

<u>Terrestrial Mammals</u>

Direct mortality or injury to the federally listed Indiana bat (*Myotis sodalis*) and Northern long-eared bat (*Myotis septentrionalis*) could occur if tree clearing activities occurred during the roosting season (i.e., approximately April-November) and bats were present. While projects would not likely directly affect winter hibernacula (e.g., caves), human disturbance in and around hibernacula when bats are present could lead to adverse effects to these species; when disturbed by noise or light, bats awaken resulting in a loss of body fat needed to help them survive in the spring (NYSDEC, 2015bm). BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Birds</u>

Three federally listed birds are known to occur within coastal areas of New York; the piping plover (*Charadrius melodus*) is also known to occur along the shorelines of the Great Lakes. Depending on the project type and location, direct mortality or injury to these birds could occur from collisions or electrocutions with manmade cables and wires, vehicle strikes, or by disturbance or destruction of nests during ground disturbing activities. If proposed project sites were unable to avoid sensitive areas, BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Reptiles and Amphibians</u>

No federally listed amphibians occur in New York; therefore, there would be no effect on listed amphibians by the Proposed Action in New York; impacts to amphibians will not be discussed further in this section.

The federally listed threatened bog turtle (*Clemmys muhlenbergii*) occurs within wetland and floodplain areas. Direct mortality to reptiles could occur in construction zones either by excavation activities or by vehicle strikes. Impacts would likely be isolated, individual events.

Three federally listed sea turtles, the green sea turtle (*Chelonia mydas*); the hawksbill sea turtle (*Eretmochelys imbricata*); and the leatherback sea turtle (*Dermochelys coriacea*), are also known to occur in the coastal area and offshore environment of New York. None of these turtles nest in the New York area. Direct mortality or injury could occur from watercraft and vessels strikes, but are unlikely as the majority of the FirstNet deployment projects would not occur in an aquatic environment. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Invertebrates</u>

Four federally listed mollusks and one endangered terrestrial invertebrate occur in New York. Direct mortality or injury could occur to these species if land clearing or excavation activities associated with the Proposed Action occur in an area inhabited by one of these species. Distribution of these species is very limited throughout the state. For example, the Chittenango ovate amber snail (*Novisuccinea chittenangoensis*) is found in only one location in central New York. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Plants</u>

Direct mortality to federally listed plants could occur if land clearing or excavation activities associated with the Proposed Action occur in an area inhabited by one of these species. Plant species include American hart's-tongue fern (*Asplenium scolopendrium* var. *Americana),* the Leedy's roseroot (*Rhodiola integrifolia* ssp. *Leedyi),* and the northeastern bulrush (*Scirpus ancistrochaetus),* which are located in specific areas of central New York, while Houghton's goldenrod (*Solidago houghtonii)* is endemic to the beaches of the Great Lakes. The northern wild monkshood (*Aconitum noveboracense*) and the small whorled pogonia (*Isotria medeoloides*) are only found in southern New York. The sandplain gerardia (*Agalinis acuta*) and seabeach amaranth (*Amaranthus pumilus*) are found along the coastal grasslands of Long Island. In general, distribution of these species is very limited throughout the state. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Reproductive Effects

Reproductive effects are considered those that either directly or indirectly reduce the breeding success of a listed species either by altering its breeding timing or location, or reducing the rates of growth, maturation, and survival of offspring, which can affect the breeding success.

Potential effects to federally listed terrestrial mammals, birds, reptiles and amphibians, invertebrates, and plants with known occurrence in New York are described below.

Terrestrial Mammals

Noise, light, and other human disturbances associated with the Proposed Action could adversely affect federally listed terrestrial mammals such as the Indiana bat (*Myotis sodalis*) and Northern long-eared bat (*Myotis septentrionalis*) within or in the vicinity of Project activities. Impacts would be directly related to the frequency, intensity, and duration of these activities. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Birds

The piping plover, red knot, and roseate tern are the only federally listed bird species that are known to nest in New York along sandy beaches or saltmarshes. The majority of FirstNet deployment activities would not occur on beaches or saltmarshes; therefore, impacts to these bird species are not anticipated. Noise, light, or human disturbance within nesting areas could cause piping plovers or roseate terns to abandon their nests, relocate to less desirable locations, or cause stress to individuals reducing survival and reproduction. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Reptiles and Amphibians

The federally listed threatened bog turtle (*Clemmys muhlenbergii*) occurs within wetland and floodplain areas. Changes in water quality, especially during the breeding seasons, resulting from ground disturbing activities could cause stress resulting in lower productivity. Land clearing activities, noise, and human disturbance during the critical time periods (e.g., mating, nesting) could lower fitness and productivity. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

The three federally listed sea turtles found in the offshore areas of New York are migrants. Consequently, no long-term reproductive effects to federally listed sea turtles are expected as a result of the Proposed Action.

Invertebrates

Changes in water quality from ground disturbing activities could cause stress resulting in lower productivity for federally listed mollusks known to occur in New York. In addition, introduction of invasive aquatic species can indirectly affect the rayed bean mussel (*Vilosa fabalis*) as result of fish populations that they rely on for their reproductive cycle being altered (USFWS, 2012e). Impacts associated with deployment activities are expected to result in less than significant changes to water quality. Impacts to wild lupine, the staple food for Karner blue butterflies (*Lycaeides melissa samuelis*) when they are caterpillars (USFWS, 2008a), could result in reduced survival and reproduction. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Plants</u>

No reproductive effects to federally listed plants are expected as a result of the Proposed Action as limited pesticides would be used and avoidance measures could be undertaken.

Behavioral Changes

Effects to normal behavior patterns that could lead to disruptions in breeding, feeding, or sheltering, resulting in take of a listed species would be considered potentially significant. Potential effects to federally listed terrestrial mammals, birds, reptiles, invertebrates, and plants with known occurrence in New York are described below.

<u>Terrestrial Mammals</u>

Noise, light, and other human disturbances associated with the Proposed Action may disturb roosts or colonies of the Northern long-eared bat. Impacts would be directly related to the frequency, intensity, and duration of these activities. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Birds</u>

Because many birds have extremely long migrations, protection efforts for critical sites along migratory routes must be coordinated over vast distances often involving many different countries. For example, the red knot has been found to fly up to 9,300 miles from their breeding and wintering sites and often return to the same stopover sites year and after year in New York. Disturbance in stopover, foraging, or breeding areas (visual or noise) or habitat loss/fragmentation can cause stress to individuals causing them to abandon areas for less desirable habitat and potentially reduce over fitness and productivity. Activities related to the Proposed Action, such as aerial deployment or construction activities, could result in adverse effects to federally listed birds. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

<u>Reptiles and Amphibians</u>

Habitat loss or alteration, particularly from fragmentation or invasive species, could adversely affect nesting and foraging sites of the bog turtle, resulting in reduced survival and productivity.

Disturbances during deployment activities are not anticipated to stress federally listed reptiles. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Invertebrates

Changes in water quality, habitat loss or alternation, and introduction of aquatic invasive species could impact food sources for federally listed mollusks resulting in lower productivity. Disturbances to wild lupine, especially during the breeding season, in areas known to have Karner blue butterflies could impact survival. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Plants

No behavioral effects to federally listed plants are expected as a result of the Proposed Action.

Loss or Degradation of Designated Critical Habitat

Effects to designated critical habitat and any of its essential features that could diminish the value of the habitat for the listed species or its survival and recovery would be considered an adverse effect and could be potentially significant. Depending on the species or habitat, the adverse effect threshold would vary for geographic extent. FirstNet activities are generally expected to be small-scale in nature, therefore large-scale impacts are not expected; however, it is possible that small-scale changes could lead to potentially significant adverse effects for certain species. For example, impacts to designated critical habitat for a listed species that is only known to occur in one specific location geographically. However, only the piping plover has designated critical habitat in the state.

Terrestrial Mammals

No designated critical habitat occurs for terrestrial mammals in New York. Therefore, no effect to threatened and endangered species from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Birds

Critical habitat for the piping plover has been designated for the Great Lakes population in New York along the Lake Ontario shoreline in Oswego and Jefferson Counties. Land clearing, excavation activities, and other ground disturbing activities in this region of New York could lead to habitat loss or degradation, which could lead to adverse effects to the piping plover depending on the duration, location, and spatial scale of the associated activities. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

No critical habitat has been designated for red knot or roseate tern populations that are known to occur in New York; therefore, no effect to these federally listed birds from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Reptiles and Amphibians

No designated critical habitat occurs for reptiles in New York. Therefore, no effect to threatened and endangered reptile species from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Invertebrates

No designated critical habitat occurs for terrestrial or aquatic invertebrates in New York. Therefore, no effect to threatened and endangered invertebrate species from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Plants

No designated critical habitat occurs for plants in New York. Therefore, no effect to threatened and endangered plants species from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to threatened and endangered species and others would not. In addition, and as explained in this section, the same type of Proposed Action infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. The threatened and endangered species that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to threatened and endangered species or their habitat under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance, including noise, associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Although threatened and endangered species and their habitat could be impacted, it is anticipated that effects to threatened and endangered species would be temporary, infrequent, and likely not conducted in locations designated as vital or critical for any period.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to threatened and endangered species or their habitat because there would be no ground disturbance and very limited human activity.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact threatened and endangered because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact protected species, it is anticipated that this activity would have no impact on protected species.

Activities with the Potential to Affect Listed Species

Potential deployment-related effects to threatened and endangered species and their habitats as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential effects to threatened and endangered species include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to threatened and endangered species. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct injury/mortalities of threatened and endangered species that are not mobile enough to avoid construction activities (e.g. reptiles, mollusks, small mammals, and young), that utilize burrows (e.g., ground squirrels), or that are

defending nest sites (e.g., ground-nesting birds). Disturbance, including noise, associated with the above activities could result in direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat if BMPs and mitigation measures are not implemented.

- New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilitates to house outside plant equipment could result in potential impacts to threatened and endangered species and their habitat. Impacts may vary depending on the number or individual poles installed, but could include direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat.

- Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could result in direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat to threatened and endangered species. Noise disturbance from heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in reproductive effects or behavior changes.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water and construction of landings and/or facilities on the shore to accept submarine cables could potentially impact threatened and endangered species and their habitat, particularly aquatic species (see Section 11.2.4, Water Resources, for a discussion of potential impacts to water resources). Effects could include direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. If activities occurred during critical time periods, reproductive effects and behavioral changes could occur.

- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts, there would be no impacts to threatened and endangered species or their habitats. If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, such disturbance could result in direct injury/mortality of threatened and endangered species as described for other New Build activities. Reproductive effects, behavioral changes, and loss/degradation of designated critical habitat could also occur as a result of construction and resulting disturbance.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to threatened and endangered species and their habitat. Land/vegetation

clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads could result in direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. Security lighting and fencing could result in direct injury/mortality, disruption of normal behavior patterns, as well as reproductive effects. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower; FirstNet activities would be infrequent, temporary, or short-term in nature and are unlikely to result in direct injury/mortality or behavioral changes to threatened and endangered species. However, if replacement towers or structural hardening are required, impacts could be similar to new wireless construction. Hazards related security/safety lighting and fencing may produce direct injury/mortality, reproductive effects, and behavioral changes. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
- Deployable Technologies: Implementation of land-based deployable technologies including COWs, COLTs, or SOWs could result in direct injury/mortalities to threatened and endangered species on roadways. If external generators are used, noise disturbance could potentially result in reproductive effects or behavioral changes to threatened and endangered species. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Deployment of drones, piloted aircraft, balloons, or blimps could potentially impact threatened and endangered species by direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. The magnitude of these effects depends on the timing and frequency of deployments.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or underwater cables; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to threatened and endangered species associated with deployment of this infrastructure could include direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat depending on the species' phenology and the nature and extent of the habitats affected. These impacts may affect, but are not likely adversely affect protected species; BMPs and mitigation measures identified in Chapter 17 and as defined through consultation with the appropriate resource agency, could help to mitigate or reduce potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The threatened and endangered species that would be affected would depend on the species' phenology and the nature and extent of the habitats affected.

It is anticipated that operational impacts may affect, but are not likely to adversely affect threatened and endangered species due to routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Site maintenance, including mowing or application of herbicides, may affect, but are not likely to adversely affect threatened and endangered species, as they would be conducted infrequently and in compliance with BMPs and mitigation measures developed through consultation with the appropriate resource agency.

During operations, direct injury/mortality of threatened and endangered species could occur from collisions and/or entanglements with transmission lines, towers, and aerial platforms. Listed species may be affected, but are not likely to be adversely affected. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Threatened and endangered species may be affected, but are not likely to be adversely affected, by the reduction in habitat quality associated with habitat fragmentation from the presence of access roads, transmission corridors, and support facilities. These features could also continue to disrupt movements of some species, particularly during migrations between winter and summer ranges. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to threatened and endangered species associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration.

Therefore, potential impacts to threatened and endangered species as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies may affect, but is not likely to adversely affect, threatened and endangered species through direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. Greater frequency and duration of deployments could change the magnitude of impacts depending on species, life history, and region of the state. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

Operational Impacts

As explained above, operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that activities may affect, but are not likely to adversely affect, threatened and endangered species and their habitats as a result of routine operations, management, and monitoring. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 17, may be implemented as appropriate to further minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the nationwide, interoperable, public safety broadband network would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no effects to threatened and endangered species as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.6.6, Threatened and Endangered Species and Species of Conservation Concern.

11.2.7 Land Use, Recreation, and Airspace

11.2.7.1 Introduction

This section describes potential impacts to land use, recreation, and airspace resources in New York associated with deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.7.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on land use, recreation, and airspace resources were evaluated using the significance criteria presented in Table 11.2.7-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to land use, recreation, and airspace resources addressed in this section are presented as a range of possible impacts.

11.2.7.3 Description of Environmental Concerns

Direct Land Use Change

Changes in land use could be influenced by the deployment, operation, and maintenance of facilities or other infrastructure, and the acquisition of rights-of-way or easement. The deployment, operation, and maintenance of structures, towers, roads, and other permanent features could conflict with exiting development or land use. The installation of poles, towers, structures, or other above-ground facilities or assets could have short- or long-term effects to existing development or land use based on the characteristics of the structures or facilities, such as the location, type, or height. In addition, the acquisition of rights-of-way or easements and the construction of roads to access facilities and locations could influence changes in land use. The effects from these actions would depend on the geographic location; compatibility with existing land uses; and characteristics of the right-of-way, easement, or access road. These characteristics, such as the length, width, and location could change the existing land use to another category or result in the short- or long-term loss of the existing land use.

Based on the impact significance criteria presented in Table 11.2.7-1, less than significant impacts would be anticipated given the size and nature of the majority of the proposed deployment activities. Direct land use changes would be minimized and isolated at specific locations and all required permits would be obtained; only short-term impacts during the construction phase would be expected.

Table 11.2.7-1: Impact Significance Rating Criteria for Land Use, Recreation, and Airspace

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Direct land use change	Magnitude or Intensity	Change in designated/permitted land use that conflicts with existing permitted uses, and/or would require a change in zoning. Conversion of prime or unique agricultural lands	Effect that is potentially significant, but with mitigation is less than significant	Minimal changes in existing land use, or change that is permitted by-right, through variance, or through special exception	No changes to existing development, land use, land use plans, or policies. No conversion of prime or unique agricultural lands
	Geographic Extent	Regional impacts observed throughout the state or territory		Effects realized at one or multiple isolated locations	NA
	Duration or Frequency	Permanent: Land use altered indefinitely		Short-Term: Land use altered for as long as the entire construction phase or a portion of the operations phase	NA
Indirect land use change	Magnitude or Intensity	New land use directly conflicts with surrounding land use pattern, and/or causes substantial restriction of land use options for surrounding land uses	Effect that is potentially significant, but with mitigation is less than significant	New land use differs from, but is not inconsistent with, surrounding land use pattern; minimal restriction of land use options for surrounding land uses	No conflicts with adjacent existing or planned land uses
	Geographic Extent	Regional impacts observed throughout the state or territory		Effects realized at one or multiple isolated locations	NA
	Duration or Frequency	Permanent: Land use altered indefinitely		Short-Term: Land use altered for as long as the entire construction phase or a portion of the operations phase	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Loss of access to public or private recreation land or activities	Magnitude or Intensity	Total loss of access to recreation land or activities	Effect that is potentially significant, but with mitigation is less than significant	Restricted access to recreation land or activities	No disruption or loss of access to recreational lands or activities
	Geographic Extent	Most or all recreational land/sites in a state or territory; recreational lands/sites that are of national significance		Effects realized at one or multiple isolated locations; recreational lands that are not nationally significant, but that are significant within the state/territory	NA
	Duration or Frequency	Persists during the life of the project		Persists for as long as the entire construction phase or a portion of the operations phase	NA
Loss of enjoyment of public or private recreation land (due to visual, noise, or other impacts that make recreational activity less desirable)	Magnitude or Intensity	Total loss of enjoyment of recreational activities; substantial reduction in the factors that contribute to the value of the recreational resource, resulting in avoidance of activity at one or more sites	Effect that is potentially significant, but with mitigation is less than significant	Small reductions in visitation or duration of recreational activity	No loss of enjoyment of recreational activities or areas; no change to factors that contribute to the value of the resource
	Geographic Extent	Most or all recreational land/sites in a state or territory; recreational lands/sites that are of national significance		Effects realized at one or multiple isolated locations; recreational lands that are not nationally significant, but that are significant within the state/territory	NA
	Duration or Frequency	Persists during or beyond the life of the project		Persists for as long as the entire construction phase or a portion of the operations phase	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Use of airspace	Magnitude or Intensity	Measurable, substantial change in flight patterns and/or use of airspace	Effect that is potentially significant, but with mitigation is less than significant	Alteration to airspace usage is minimal	No alterations in airspace usage or flight patterns
	Geographic Extent	Regional impacts observed throughout the state or territory		Effects realized at one or multiple isolated locations	NA
	Duration or Frequency	Permanent: Airspace altered indefinitely		Short-Term: Airspace altered for as long as the entire construction phase or a portion of the operations phase	NA

NA = not applicable

Indirect Land Use Change

Changes in surrounding land use patterns and options for surrounding land uses could be influenced by the deployment, operation, and maintenance of facilities and the acquisition of rights-of-way or easement. The deployment, operation, and maintenance of structures, towers, roads, and other permanent features could conflict with surrounding land use patterns and options for surrounding land uses. The installation of poles, towers, structures, or other above-ground facilities or assets could have short- or long-term effects to surrounding land use patterns or options for surrounding land uses based on the characteristics of the structures or facilities, such as the location, type, or height. In addition, the acquisition of ROWs or easements and the construction of roads to access facilities and locations could influence changes in surrounding land uses. The effects from these actions would depend on the geographic location; compatibility with surrounding land uses; and characteristics of the ROW, easement, or access road. These characteristics, such as the length, width, and location could conflict with surrounding land use patterns or restrict options for surrounding land uses.

Based on the impact significance criteria presented in Table 11.2.7-1, less than significant impacts would be anticipated as any new land use would be small-scale and consistent with the surrounding land uses in the area; only short-term impacts during the construction phase would be expected.

Loss of Access to Public or Private Recreation Land or Activities

Access to public or private recreation land or activities could be influenced by the deployment, operation, and maintenance of facilities and the acquisition of rights-of-way or easement. Localized, short-term accessibility to recreation land or activities could be impacted by the deployment and maintenance of structures, towers, roads, and other permanent features. In the long-term, the deployment and installation of poles, towers, structures, or other aboveground facilities could alter the types and locations of recreation activities.

Based on the impact significance criteria presented in Table 11.2.7-1, less than significant impacts would be anticipated as restricted access or a loss of access to recreation areas would not occur; only short-term impacts or small-scale limitations during the construction phase would be expected.

Loss of Enjoyment of Public or Private Recreation Land

The deployment of new towers, and the resulting built tower, could influence the enjoyment of public or private recreation land. Enjoyment of recreation land could be temporarily impacted by crews accessing the site during the deployment and maintenance of structures, towers, roads, and other permanent features. The deployment of poles, towers, structures, or other aboveground facilities could affect the enjoyment of recreational land based on the characteristics of the structures or facilities, including permanent impacts to scenery, short-term noise impacts, and the presence of deployment or maintenance crews.

Based on the impact significance criteria presented in Table 11.2.7-1, less than significant impacts would be anticipated as only small reductions, if any, in recreational visits or durations would occur due to the relatively small-scale nature of likely FirstNet activities. Only short-term impacts during the construction phase would be expected.

Use of Airspace

Primary concerns to airspace include the following: if aspects of the Proposed Action would result in violation of FAA regulations; undermine the safety of civilian, military, or commercial aviation; or infringe on flight activity and flight corridors. Impacts could include air routes or flight paths, available flight altitudes, disruption of normal flight patterns, and restrictions to flight activities. Construction of new towers or alternations to existing towers could obstruct navigable airspace depending on tower location. Use of aerial technologies could result in SUA considerations.

Based on impact significance criteria presented in Table 11.2.7-1, airspace impacts are not likely to change or alter flight patterns or airspace usage. As drones, balloons, and piloted aircraft would likely only be deployed in an emergency and for a short period of time, FirstNet would likely not impact airspace resources.

11.2.7.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure, and the specific deployment requirements, some activities would result in potential impacts to land use, recreation, and airspace resources and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to land use, recreation, and airspace resources under the conditions described below:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring alongside the road in utility corridors or within public road ROWs.
    - <u>Land Use:</u> See Activities likely to Have Impacts below.

- Recreation: See Activities likely to Have Impacts below.

- Airspace: No impacts to airspace would be anticipated since the activities would not affect flight patterns or cause obstructions that would require FAA and/or state review based on Federal Aviation Regulation (FAR) 14 CFR, Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (See Section 11.11.7.7, Obstructions to Airspace Considerations).

- Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas.

  - Land Use: It is anticipated that there would be no impacts to land use since the activities that would be conducted would not directly or indirectly result in changes to existing and surrounding land uses.

  - Recreation: See Activities likely to Have Impacts below.

  - Airspace: It is anticipated that there would be no impacts to airspace since the activities would not affect flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (See Section 11.1.7 Obstructions to Airspace Considerations).

- New Build – Aerial Fiber Optic Plant: Installing new poles and hanging cables on previously disturbed or new (undisturbed) ROWs or easements and the potential construction of access roads.

  - Land Use: See Activities Likely to Have Impacts below.

  - Recreation: See Activities Likely to Have Impacts below.

  - Airspace: Installation of new poles would not have an effect on airspace because utility poles are an average of 40 feet in height and do not intrude into useable airspace.

- Collocation on Existing Aerial Fiber Optic Plant: Installation of new fiber on existing poles would be limited to previously disturbed areas.

  - Land Use: It is anticipated that there would be no impacts to land use since the activities that would be conducted would not directly or indirectly result in changes to existing and surrounding land uses.

  - Recreation: No impacts to recreation would be anticipated since the activities that would be conducted would not cause disruption or loss of access to recreational lands or activities or the enjoyment of those lands or activities.

  - Airspace: No impacts are anticipated to airspace from collocations.

- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber and installation of new equipment in existing huts.

  - Land Use: It is anticipated that there would be no impacts to land use since the activities would not directly or indirectly result in changes to existing and surrounding land uses.

  - Recreation: Use of existing dark fiber would not impact recreation because it would not impede access to recreational resources.

  - Airspace: Lighting of dark fiber would have no impacts to airspace.

- New Build – Submarine Fiber Optic Plant: Installing cables in limited nearshore or inland bodies of water and the constructing landings and/or facilities on shore to accept submarine cable.

  - Land Use: See Activities Likely to Have Impacts below.

  - Recreation: See Activities Likely to Have Impacts below.

  - Airspace: The installation of cables in limited nearshore or inland bodies of water and construction of landings/facilities would not impact flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (See Section 11.1.7 Obstructions to Airspace Considerations).

- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment would occur in existing boxes or huts. The section below addresses potential impacts to land use, recreation resources, and airspace if deployment of new boxes, huts, or access roads is required.

  - Land Use: See Activities Likely to Have Impacts below.

  - Recreation: See Activities Likely to Have Impacts below.

  - Airspace: No impacts to airspace would be anticipated since the activities would not affect flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (See Section 11.1.7 Obstructions to Airspace Considerations).

- Wireless Projects
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, structure, or building.
    - Land Use: There would be no impacts to existing and surrounding land uses. The potential addition of power units, structural hardening, and physical security measures would not impact existing or surrounding land uses.
    - Recreation: See Activities Likely to Have Impacts below.
    - Airspace: See Activities Likely to Have Impacts below.
- Deployable Technologies
  - Deployable Technologies: These technologies would be used where permanent, fixed infrastructure cannot be deployed due to a variety of factors such as the need to supplement coverage or to avoid or mitigate permanent impacts to sensitive resources or receptors.
    - Land Use: It is anticipated that there would be no impacts to existing or surrounding land uses because these technologies would be temporarily located in areas compatible with other land uses.
    - Recreation: No impacts to recreation are anticipated, as deployable technologies would not affect the use or enjoyment of recreational lands.
    - Airspace: Use of land-based deployable technologies (COW, COLT, and SOW) is not expected to result in impacts to airspace, provided antenna masts do not exceed 200 feet Above Ground Level (AGL) or do not trigger any of the other FAA obstruction to airspace criteria. The section below addresses potential impacts from balloons and drones.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: Installation of permanent equipment on existing structures and the use of portable devices that use satellite technology.
    - Land Use: It is anticipated that there would be no impacts to existing or surrounding land uses because these technologies would be temporarily located in areas compatible with other land uses.

    - Recreation: It is anticipated that there would be no impacts to recreational uses because these technologies would be temporarily deployed but would not restrict access to, or enjoyment of, recreational lands.

    - Airspace: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact airspace because those activities would not result in changes to flight patterns and airspace usage or result in obstructions to airspace.

  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact to land use, it is anticipated that this activity would have no impact on land use.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to land use, recreation resources, or airspace as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including changes to existing and surrounding land uses. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to land use resources include the following:

- Wired Projects

  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring alongside the road in utility corridors or within public road ROWs.

    - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations.

    - Recreation: It is anticipated that plowing, trenching, or directional boring may cause temporary, localized restrictions to recreational land or activities, which may persist during the deployment phase. It is reasonable to anticipate that small reductions in visitation to localized areas may occur during the deployment phase.

    - Airspace: No impacts are anticipated – see previous section.

  - New Build – Aerial Fiber Optic Plant: Installing new poles and hanging cables on previously disturbed or new (undisturbed) rights-of-way or easements and the potential construction of access roads.

    - Land Use: These activities could result in term potential impacts to land uses. Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New structures, poles, or access roads on previously undisturbed ROWs or easements could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new structures with existing and surrounding land uses.

- Recreation: Deployment activities may cause temporary, localized restricted access to recreation land or activities, which may persist for the duration of the deployment phase. Small reductions to visitation during the deployment phase may be anticipated.
- Airspace: No impacts are anticipated – see previous section.

- New Build – Submarine Fiber Optic Plant: Installing cables in limited nearshore and inland bodies of water and the constructing landings and/or facilities on shore to accept submarine cable.
  - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New landings and/or facilities on shore could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new facilities with existing and surrounding land uses.
  - Recreation: Deployment may temporarily restrict recreation on or within limited nearshore and inland bodies of water and the surrounding area during the deployment phase. Reductions in visitation may result during deployment.
  - Airspace: No impacts are anticipated – see previous section.
- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of equipment including construction of new boxes, huts, or access roads.
  - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New boxes, huts, or access roads could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new facilities with existing and surrounding land uses.
  - Recreation: Deployment of installation equipment and the construction of boxes, huts, or access roads may restrict access to recreation land or activities. Reductions in visitation during deployment may occur.
  - Airspace: No impacts are anticipated – see previous section.

- Wireless Projects
  - New Wireless Communication Towers: Installing new wireless towers, associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads.
    - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New wireless towers, associated structures, or access roads could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new facilities with existing and surrounding land uses.
    - Recreation: Deployment of new towers and associated structures could result in temporary, localized restricted access for recreation land or activities for the duration of the deployment phase. Reductions in visitation or duration of recreational activity may result from restricted access.
    - Airspace: Installation of new wireless towers could result in impacts to airspace if towers exceed 200 feet AGL or meets the other criteria listed in Section 11.1.7.5, Obstructions to Airspace Considerations. An OE/AAA could be required for the FAA to determine if the proposed construction does affect navigable airways or flight patterns of an airport if the aerial fiber optic plant is located in proximity to one of New York's airports
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower.
    - Land Use: No impacts are anticipated – see previous section.
    - Recreation: Installation of antennas or microwaves to existing towers may cause temporary, localized restricted access to recreation lands or activities during installation, which may cause small reductions in visitation for the duration of installation.
    - Airspace: Collocation of mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, addition of power units, structural hardening, and physical security measures could result in impacts if located near airports or air navigation facilities.
- Deployable Technologies
  - Deployable Technologies: These technologies would be used where permanent, fixed infrastructure cannot be deployed due to a variety of factors such as the need to

supplement coverage or to avoid or mitigate permanent impacts to sensitive resources or receptors.

- Land Use: No impacts are anticipated – see previous section.
- Recreation: No impacts are anticipated – see previous section.
- Airspace: Implementation of Deployable Aerial Communications Architecture (DACA) could result in temporary or intermittent impacts to airspace. Deployment of tethered systems (such as balloons or blimps) could pose an obstruction hazard if deployed above 200 feet and near New York airports (See Section 11.1.7 Obstructions to Airspace Considerations). Potential impacts to airspace (such as SUAs and MTRs) may be possible depending on the planned use of drones, piloted aircraft, untethered balloons, and blimps (e.g., frequency of deployment, altitudes, proximity to airports and airspaces classes/types, length of deployment, etc.). Coordination with the FAA would be required to determine any potential impacts or required certifications.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: The installation of permanent equipment on existing structures and the use of portable devices that use satellite technology.
    - Land Use: No impacts are anticipated – see previous section.
    - Recreation: It is anticipated the installation of equipment on existing structures may cause temporary, localized restricted access to recreation lands or activities during installation, which may cause small reductions in visitation for the duration of installation.
    - Airspace: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology may impact airspace if equipment creates an obstruction.

In general, the abovementioned activities could potentially involve construction, including the construction of access roads. Potential impacts to land uses associated with deployment of this infrastructure could include temporary restrictions to existing and surrounding land uses in isolated locations. Potential impacts to recreation land and activities could include temporary, localized restricted access and reductions in visitation or duration of recreational activities. Potential impacts to airspace could include obstructions to airspace or affect flight profiles and operating parameters of SUAs/MTRs. These impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no impacts to land use, recreation resources, or airspace associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for temporary, short-term inspections. If routine maintenance or inspection activities would conflict with existing or surrounding land uses, impact recreation resources, or conflict with airspace, impacts could result as explained above. Operation of the Deployable Technologies options of the Preferred Alternative could result in the temporary presence of deployable vehicles and equipment (including airborne equipment), potentially for up to two years in some cases. The degree of change in the visual environment (see Section 11.2.8, Visual Resources)—and therefore the potential indirect impact on a landowner's ability to use or sell of their land as desired—would be highly dependent on the specific deployment location and length of deployment. The use of deployable aerial communications architecture could temporarily add new air traffic or aerial navigation hazards. The magnitude of these effects would depend on the specific location of airborne resources along with the duration of their use. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.7.5 Alternatives Impact Assessment

The following section assesses potential impacts to land use, recreation resources, and airspace associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to land use, recreation, and airspace resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to land use if deployment occurs in areas with compatible land uses. While a single deployable technology may have imperceptible impact, multiple technologies operating in close proximity for longer periods could impact existing and surrounding land uses. There could be impacts to recreation activities during the deployment of technologies if such deployment were to occur within or near designated recreation areas. Enjoyment of activities dependent upon the visibility of wildlife or scenic vistas may be affected. Also, implementation of deployable technologies could result in less than significant impacts to airspace if deployment does trigger any obstruction criterion or result in changes to flight patterns and airspace restrictions. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to land use, recreation resources, or airspace associated with routine inspections of the Deployable Technologies Alternative, assuming that the same access roads used for deployment are also used for inspections. Operation of deployable technologies would result in land use, land ownership, airspace, and recreation (access and enjoyment) similar in type to those described for the Preferred Alternative. The frequency and extent of those potential impacts would be greater than for the Proposed Action because under this Alternative, deployable technologies would be the only options available. As a result, this alternative would require a larger number of terrestrial and airborne deployable vehicles and a larger number of deployment locations in—all of which would potentially affect a larger number of properties and/or areas of airspace. Overall, these potential impacts would be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure, or satellites and other technologies. As a result, there would be no impacts to land use, recreation resources, or airspace. Environmental conditions would therefore be the same as those described in Section 11.1.7, Land Use, Recreation, and Airspace.

11.2.8 Visual Resources

11.2.8.1 Introduction

This section describes potential impacts to visual resources in New York associated with construction/deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.8.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on visual resources were evaluated using the significance criteria presented in Table 11.2.8-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to visual resources addressed in this section are presented as a range of possible impacts.

Table 11.2.8-1: Impact Significance Rating Criteria for Visual Resources

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Adverse change in aesthetic character of scenic resources or viewsheds	Magnitude or Intensity	Fundamental and irreversibly negative change in aesthetic character	Effect that is potentially significant, but with mitigation is less than significant	Intermittently noticeable change in aesthetic character that is marginally negative	No visible effects
	Geographic Extent	Regional impacts observed throughout the state/territory		Effects realized at one or multiple isolated locations	No visible effects
	Duration or Frequency	Permanent or persistent changes to aesthetic character lasting throughout or beyond the construction or deployment phase		Persisting through the construction and deployment phase, but aesthetics of the area would be returned to original state following the construction and deployment phase	Transient or no visible effects
Nighttime lighting	Magnitude or Intensity	Lighting dramatically alters night-sky conditions	Effect that is potentially significant, but with mitigation is less than significant	Lighting alters night-sky conditions to a degree that is only intermittently noticeable	Lighting does not noticeably alter night-sky conditions
	Geographic Extent	Regional impacts observed throughout the state/territory		Effects realized at one or multiple isolated locations	No visible effects
	Duration or Frequency	Permanent or persistent changes to night-sky conditions lasting throughout or beyond the construction or deployment phase		Persisting through the construction and deployment phase, but lighting would be removed and night-sky conditions would be returned to original state following the construction and deployment phase	Transient or no visible effects

11.2.8.3 Description of Environmental Concerns

Adverse change in aesthetic character of scenic resources or viewsheds

A primary concern during and following construction of structures, towers, roads or other permanent features is the long-term disruption of scenery and viewsheds. In New York, residents and visitors travel to many national monuments, historic sites, and state parks, such as Fire Island to view its scenic coast and beaches. If lands considered visually significant or scenic were subject to vegetation loss or removal, short- or long-term effects to viewsheds or scenic resources could occur. Bare ground or interruption of a landscape due to vegetation removal could be considered an adverse change in the aesthetic character of scenic resources or viewsheds. New towers or structures constructed within scenic areas could disrupt the perceived aesthetic character or scenery of an area.

New York's Article XIV of the New York State Constitution requires that forest preserves and natural areas "shall be forever kept as wild forest lands." When a facility is potentially within the viewshed of a designated aesthetic resource, the NYSDEC requires a visual assessment, and in the case where significant impacts are identified, requires the applicant to "employ reasonable and necessary measures to either eliminate, mitigate, or compensate for adverse aesthetic effects" (NYSDEC, 2000). If new towers were constructed to a height that required lighting, nighttime vistas could be affected in areas where the night skies do not have light disruptions or are within unpopulated areas.

Based on the impact significance criteria presented in Table 11.2.8-1, impacts to the aesthetic character of scenic resources or viewsheds would be considered potentially significant if landscapes were permanently removed or fragmented, or if damage to historic or cultural resources occurred. Given the small-scale of likely FirstNet activities, impacts are expected to be less than significant.

Nighttime lighting

If new towers or facilities were constructed to a height that required lighting, nighttime vistas could be affected in areas where the night skies do not have light disruptions or are within unpopulated areas.

Based on the impact significance criteria presented in Table 11.2.8-1, lighting that illuminates the night sky on a regional basis, diminishes night sky viewing over long distances, and persists over the long-term would be considered potentially significant. Although likely FirstNet actions are expected to be small-scale, certain discrete locations may experience potentially significant impacts to night skies.

11.2.8.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction/deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to visual resources and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to visual resources under the conditions described below:

- Wired Projects
  - Collocation on Existing Aerial Fiber Optic Plant: While the addition of new aerial fiber optic plant to an existing aerial fiber optic transmission system would likely be visible, the change associated with this option is so small as to be essentially imperceptible. This option would involve no new nighttime lighting and pole replacement would be limited.
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to visual resources since the activities would be conducted at small entry and exit points and are not likely to produce perceptible changes, and would not require nighttime lighting.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to visual resources because there would be no ground disturbance, would not require nighttime lighting, and would not produce any perceptible changes.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact visual resources since those activities would not require ground disturbance or vegetation removal.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch

vehicle would be very unlikely to impact visual resources, it is anticipated that this activity would have no impact on visual resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to visual resources as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur as a result of ground disturbance, vegetation removal, or installation of permanent structures if development occurs in scenic areas. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to visual resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to visual resources. The degree of impact would depend on the timing, location, and type of project; installation of a hut or POP would be permanent, whereas ground disturbing activities would be short-term. In most cases, development located next to existing roadways would not affect visual resources unless vegetation were removed or excavation occurred in scenic areas.
  - New Build – Aerial Fiber Optic Plant: Construction and installation of new or replacement poles and hanging cables could result in impacts to the aesthetic character of scenic resources or viewsheds depending on the location of the installation. In most cases, development in public rights-of-ways would not affect visual resources unless vegetation were removed or construction occurred in scenic areas. If new lighting were necessary, impacts to night skies could occur. Construction of new roadways could result in linear disruptions to the landscape, surface disturbance, and vegetation removal; all of which could impact the aesthetic character of scenic resources or viewsheds, depending on the location of the installation.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water would not impact visual resources. However, impacts to the aesthetic character of scenic resources or viewsheds could potentially occur as result of the construction of landings and/or facilities on shore to accept submarine cable.
  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading, vegetation removal, or other ground disturbance to install small boxes or huts, or access roads, potential impacts to visual resources could occur, but effects would be temporary and localized.
- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation

lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to visual resources. Land/vegetation clearing, excavation activities, landscape grading, and other surface disturbing activities during the installation of new wireless towers and associated structures or access roads could result in the degradation of the aesthetic character of scenic resources or viewsheds. Impacts may be experienced by viewers if new towers were located in or near a national park unit or other sensitive area. If new towers were constructed to a height that required aviation lighting, nighttime vistas could be impacted in areas where the night skies do not have light disruptions or are within unpopulated areas. If nighttime lighting were necessary for the operation or function of a facility, impacts to night sky conditions could occur.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower and would not likely result in additional impacts to visual resources. However, if additional power units, structural hardening or physical security measures required ground disturbance or removal of vegetation, impacts to the aesthetic character of scenic resources or viewsheds could occur.

- Deployable Technologies: Implementation of deployable technologies could result in potential impacts to visual resources if long-term deployment occurs in scenic areas, or if the implementation requires minor construction of staging or landing areas, results in vegetation removal, areas of surface disturbance, or additional nighttime lightning.

In general, the abovementioned activities could potentially involve land/vegetation clearing, and potential scenic intrusion of towers, poles, roads, infrastructure, and other structures. Potential impacts to visual resources associated with deployment could include interruptions of landscapes, degradation of the aesthetic character of scenic resources or viewsheds, and overall changes in valued scenic resources, particularly for permanent fixtures such as towers or facilities. These impacts are expected to be less than significant, although certain discrete locations could have potentially greater impacts to night skies or as a result of new towers. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there would be no impacts to visual resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Nighttime lighting in isolated rural areas or if sited near a national park would be less than significant with BMPs and mitigation measures incorporated during operations. Additionally, FirstNet would work closely with the National Park Service (NPS) to address any concerns they might have if a tower needed to be placed in an area that might affect the nighttime sky at a NPS unit. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.8.5 Alternatives Impact Assessment

The following section assesses potential impacts to visual resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to infrastructure as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in potential impacts to visual resources if long-term deployment occurs in scenic areas. If staging or landing areas (depending on the type of technology) require surface disturbance or vegetation clearing, or if these areas were within scenic landscapes or required new nighttime lighting, impacts could occur to the aesthetic character of scenic resources or viewsheds. These impacts are expected to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to visual resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. The potential visual impacts—including aesthetic conditions and nighttime lighting—of the operation of deployable technologies would be less than significant. These potential impacts would be similar to the potential impacts described for the Deployable Technologies option of the Preferred Alternative, above, only likely with greater numbers of deployable units. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to visual resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.8, Visual Resources.

11.2.9 Socioeconomics

11.2.9.1 Introduction

This section describes potential impacts to socioeconomics in New York associated with deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.9.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on socioeconomics were evaluated using the significance criteria presented in Table 11.2.9-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to socioeconomics addressed in this section are presented as a range of possible impacts.

Table 11.2.9-1: Impact Significance Rating Criteria for Socioeconomics

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Impacts to real estate (could be positive or negative)	Magnitude or Intensity	Changes in property values and/or rental fees, constituting a significant market shift	Effect that is potentially significant, but with mitigation is less than significant	Indiscernible impact to property values and/or rental fees	No impacts to real estate in the form of changes to property values or rental fees
	Geographic Extent	Regional impacts observed throughout the state/territory		Effects realized at one or multiple isolated locations	NA
	Duration or Frequency	Persists during the life of the project		Persists for as long as the entire construction phase or a portion of the operations phase	NA
Changes to spending, income, industries, and public revenues	Magnitude or Intensity	Economic change that constitutes a market shift	Effect that is potentially significant, but with mitigation is less than significant	Indiscernible economic change	No change to tax revenues, wages, major industries, or direct spending
	Geographic Extent	Regional impacts observed throughout the state/ territory		Effects realized at one or multiple isolated cities/towns	NA
	Duration or Frequency	Persists during or beyond the life of the project		Persists for as long as the entire construction phase or a portion of the operations phase	NA
Impacts to employment	Magnitude or Intensity	High level of job creation at the state or territory level	Effect that is potentially significant, but with mitigation is less than significant	Low level of job creation at the state/territory level	No job creation due to project activities at the state/territory level
	Geographic Extent	Regional impacts observed throughout the state/territory		Effects realized at one or multiple isolated cities/towns	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
	Duration or Frequency	Persists during the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase	NA
Changes in population number or composition	Magnitude or Intensity	Substantial increases in population, or changes in population composition (age, race, gender)	Effect that is potentially significant, but with mitigation is less than significant	Minor increases in population or population composition	No changes in population or population composition
	Geographic Extent	Regional impacts observed throughout the state or territory		Effects realized at one or multiple isolated locations	NA
	Duration or Frequency	Persists during the life of the project		Persists for as long as the entire construction phase or a portion of the operations phase	NA

NA = Not Applicable

11.2.9.3 Description of Environmental Concerns

This section discusses at a high level the types of socioeconomic impacts that could result from deployment of the NPSBN. Socioeconomic impacts could be negative or positive. Subsections below address socioeconomic impacts in four general areas, following the breakdown of the significance rating criteria in the table above:

- Impacts to Real Estate
- Economic Benefits or Adverse Impacts related to Changes in Spending, Income, Industries, and Public Revenues
- Impacts to Employment
- Changes in Population Number or Composition

In addition to the specific impacts noted below, the Proposed Action would likely have broad, beneficial impacts to all four areas in times of disaster, by improving the response of public safety personnel. Reduced damages and faster recovery would result. This would support property values; maintain corporate income, personal income, and government revenues; preserve jobs; and reduce disruptions to populations.

Impacts to Real Estate

Deployment of the NPSBN has the potential to improve property values in areas that have reduced property values below typical market values due to below average public safety communication services. Improved services would likely reduce response times and improve responses. These effects would reduce the potential for economic losses and thus support investments in property and greater market value for property. Any increases in property values are most likely in areas that have low property values and below average public safety communication services. Increases are less likely in areas that already have higher property value. As discussed in Existing Environment, property values vary considerably across New York. Median values of owner-occupied housing units range from over $450,000 in the greater New York City area, to below and around $100,000 in smaller population concentration areas such as Elmira, Utica, and Binghamton. These figures are general indicators only; any property value effects of deployment of the NPSBN would occur at a much more localized level.

Some telecommunications infrastructure, such as wireless communications towers, may adversely affect property values, depending on infrastructure location and other characteristics. Researchers believe these negative impacts relate to perceptions of the aesthetics of towers, or fears over electromagnetic radiation. Economists and appraisers have studied this issue and use a statistical analysis methodology known as hedonic pricing, or hedonic modelling, to assess how different attributes of properties such as distance from a tower affect property value (Bond, Sims, & Dent, 2013). Essentially, analysts compare the value of multiple properties while statistically controlling for differences in property attributes, in order to isolate the effect of a specific attribute such as proximity of a communications tower.

A recent literature review examined such studies in the United States, Germany, and New Zealand (Bond, Sims, & Dent, 2013). These studies all focused on residential properties. One study identified a positive effect on price in one neighborhood due to the presence of a wireless communications tower. Most studies identified negative effects on price. Generally, these negative effects were small: an approximately two percent decrease in property price. In one case, the average reduction in price was 15 percent. In all cases, the effects declined rapidly with distance, with some cases showing no effect beyond 100 meters (328 feet) and one case showing effects up to about 300 meters (984 feet).

Based on review of the particulars of each study, the literature review authors hypothesize that many additional factors regarding communications towers, besides distance, may affect property value. These include the type, height, size, and appearance of communication towers; grouping of towers; the level of activity in the property market at the time properties are listed or sold; and the level of negative local media focus on potential health effects of communication towers at the time properties are listed or sold.

Economic Benefits or Adverse Impacts related to Changes in pending, Income, Industries, and Public Revenues

Developing the NPSBN may increase economic activity as governments and contractors make expenditures to deploy, operate, and maintain telecommunications and broadband infrastructure. Funds for such expenditures would come primarily from federal, state, and local government sources or through private entities under a written agreement with such governmental entities. FirstNet has three primary sources of funding to carry out its mission: (1) up to $7 billion in cash funded by proceeds of incentive auctions authorized by the Act; (2) network user or subscriber fees; and (3) fees from covered leasing agreements that allow FirstNet to permit a secondary users to access network capacity on a secondary basis for non-public safety services only. The use of NPSBN capacity on a secondary basis for non-public safety services, including commercial services, by parties entering into a covered leasing agreement with FirstNet may also increase economic activity and generation of income for such party.

Direct spending of federal, state, and private sector funds to deploy and operate the NPSBN would likely represent new income to businesses that provide goods and services for the network. This is a positive impact. This direct impact would lead to indirect impacts (as directly impacted businesses purchase supporting goods and services) and induced impacts (as the employees of all affected businesses spend the wages they have earned). Because most FirstNet infrastructure investments would be dispersed across the nation, the business income and wages generated in any particular state or community would generally be small relative to the overall state or community economy, but measurable. Based on the significance criteria above, the business income and wage impacts would be considered positive and less than significant. It is also highly unlikely that these impacts would lead to significant market shifts or other significant changes to local/regional economic structure.

Spending and income generation related to developing the NPSBN would also result in changes to public revenues. Property taxes may change as property values increase or decrease due to the installation of new infrastructure. General and selective sales taxes may change (most likely increase), reflecting expenditures during system development and maintenance. Public utility tax revenues may change. These taxes are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services (U.S. Census Bureau, 2006). These service providers may obtain new taxable revenues from operation of components of the public safety broadband network. In such cases, public utility tax revenues may increase, but they could also remain the same or decrease if providers are granted tax breaks in return for operating portions of the network. Individual and corporate income taxes may change as FirstNet infrastructure development and operation creates new taxable income for involved companies and workers.

FirstNet's partner(s) may be given the right to use excess NPSBN capacity commercially. This would result in additional economic activity and generation of income. In turn, this could have revenue implications for federal and state governments, through taxes on sales and on corporate income generated by commercial use of the network.

FirstNet may have an additional, non-revenue benefit to the public sector. The network is likely to create operational cost savings and increased productivity for public safety personnel.

Impacts to Employment

Private companies and government organizations that receive income from deploying and operating the NPSBN would use portions of that income to hire the employees they need to provide their support to the network. This generation of new employment is a direct, beneficial impact of expenditures on FirstNet. Additional, indirect employment increases would occur as additional businesses hire workers to provide supporting goods and services. For instance, FirstNet partner(s) and their subcontractors and vendors would need engineers and information technology professionals, project managers, construction workers, manufacturing workers, maintenance workers, and other technical and administrative staff. Further employment gains would occur as businesses throughout the economy benefit from consumer spending by wage-earners in direct and indirectly affected businesses.

For the most part, employment gains in any particular state or community would generally be measurable, but small relative to the overall state or community economy. This is because FirstNet infrastructure investments would be dispersed across the nation. Based on the significance criteria above, the employment impacts would be considered positive and less than significant. However, even small employment games are beneficial, and would be especially welcomed in areas that have high unemployment. As discussed in Affected Environment, unemployment rates (as shown by the unemployment rate map and selected economic indicators table) vary considerably across New York. All of the northernmost counties of New York had 2014 unemployment rates above the national average, as did all of the New York City boroughs except Manhattan.

Large companies that win major contracts for deploying and operating the NPSBN may have concentrations of employees in some specific locations; for instance, engineers and other system designers may be located in one or a few specific offices. While such employment concentrations could be important to specific communities, these and other employment impacts would still not be significant based on the criteria in Table 11.2.9-1 because they would not constitute a "high level of job creation at the state or territory level."

Changes in Population Number or Composition

In general, changes in population numbers occur when employment increases or decreases to a degree that affects the decisions of workers on where they can find employment; that is, when workers and their families move to or leave an area because of employment opportunities or the lack thereof. As noted above, deployment and operation of the NPSBN is likely to generate new employment opportunities (directly and indirectly), but employment changes would not be large enough in any state to be considered significant. Therefore, it is highly unlikely that the NPSBN would lead to significant changes in population numbers according to the significance criteria table above. Further, it is unlikely that the NPSBN would lead to any measurable changes in population numbers in any geographic areas, with the possible exception of cities where companies that win major NPSBN contracts establish centers for NPSBN deployment and operation activities. Smaller numbers of employees in any area would not produce measurable population changes because population is always in flux due to births, deaths, and in-migration and out-migration for other reasons.

Population composition refers to age, gender, race, ethnicity, and other characteristics of the individuals making up a population. Given the low potential for changes to population numbers, it is highly unlikely that the NPSBN would lead to any changes in population composition.

11.2.9.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could deploy various types of facilities or infrastructure. Almost all deployment activities would have socioeconomic impacts, because all represent economic activity that would result, for instance, in expenditures and generation of income. Even if the expenditure and income generation levels a very small for each project, and not significant across the entire state, they are measurable socioeconomic impacts. These effects are measurable by economists, even if very small, but their significance is determined by application of the criteria in Table 11.2.9-1.

Activities Likely to Have No Impacts

- Satellites and Other Technologies
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact socioeconomics, it is anticipated that this activity would have no impact on socioeconomic resources.

Activities with the Potential to Have Impacts

Potential impacts to socioeconomics for the Preferred Alternative would encompass a range of impacts that could result from deployment activities. The discussion below indicates which of the four types of socioeconomic impacts discussed above and listed again here apply to each type of deployment activity. For greater detail on the nature of these impacts, see the Description of Environmental Concerns section above.

- Impacts to Real Estate
- Changes to Spending, Income, Industries, and Public Revenues
- Impacts to Employment
- Changes in Population Number or Composition

Positive impacts on property values would generally not result from one or a few particular activities, but instead would result from the totality of the new NPSBN infrastructure and operational systems that enable improved public safety services to currently underserved areas. Similarly, any change to population numbers in a few locations as discussed above would result from large contract awards and contractor decisions about employee locations, not from specific deployment activities. Therefore, these types of impacts are not included in the activity-focused discussions below.

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Installation of fiber optic cable in existing conduit would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
  - Collocation on Existing Aerial Fiber Optic Plant: Collocation of new aerial fiber optic plant on existing utility poles and other structures would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would be conducted electronically through existing infrastructure, and would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water, and associated onshore activities at existing or new facilities would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment through existing or new boxes or huts would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- New Build – Buried Fiber Optic Plant: New fiber optic cable installation usually requires construction activities and would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

  - New Build – Aerial Fiber Optic Plant: Pole/structure installation would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures, such as generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads, or access roads would have the following types of socioeconomic impacts:

    - Impacts to Real Estate – As discussed above, communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013). Such impacts, if they occur, would be limited to a small area around each project and would generally be a small percentage reduction in property value; thus, the impacts would be less than significant.

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would include mounting or installing equipment (such as antennas) on an existing facility would have the following types of socioeconomic impacts. While communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013), the impacts of existing wireless towers are presumably already factored into property values and would not be affected by the addition of new equipment.

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

  - Deployable Technologies: COWs, COLTs, and SOWs and aerial deployable technologies require storage, staging, and (for aerial deployables) launch/landing areas. Development of such areas, or enlargement of existing areas to accommodate FirstNet equipment, would have the following types of socioeconomic impacts:
    - Impacts to Real Estate – It is possible that development or enlargement of storage, staging, and launch/landing areas could have adverse impacts on nearby property values. This is because such facilities may have adverse aesthetic aspects (e.g., large areas of pavement and large numbers of parked vehicles), equipment maintenance activities at such facilities may generate noise, and operational activities may generate traffic. Such factors could affect nearby property values. These impacts, if they occur, would occur within a limited distance of each site, and would be limited to a relatively small number of sites within the region and state. Therefore, these impacts would be less than significant.
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the deployment of such devices and equipment would be similar to collocation of wireless equipment on existing wireless towers, structures, or buildings, and would have the following types of socioeconomic impacts:

- Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

- Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

In general, the abovementioned activities would have less than significant beneficial socioeconomic impacts. To the extent that certain activities could have adverse impacts to property values, those impacts are also expected to be less than significant, as described above. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

The discussion above characterized the impacts of each type of activity. The socioeconomic impacts of all activities considered together would also be less than significant. Even when considered together, the impacts would be very small relative to the total economic activity and property value of any region or the state. In addition, with the possible exception of property values, all deployment impacts would be limited to the construction phase.

Operation Impacts

Activities with the Potential to Have Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of primarily of routine maintenance and inspection of fixed infrastructure. As with deployment activities, all operational activities would have socioeconomic impacts, because all represent economic activity. All operational activities would be conducted by public or private sector employees, and therefore support employment and involve payment of wages. Even if these economic effects are a very small for each operational activity, and not significant across the entire state, they are measurable socioeconomic impacts.

Potential socioeconomic impacts would primarily be beneficial, and generally of these types:

- Changes to Spending, Income, Industries, and Public Revenues – Operational activities would require expenditures, which then generate business income and employee wages, and may result in new public sector revenues such as taxes on sales and income. All such effects would be small in scale relative to the regional and state economy; their impacts would be less than significant.
- Impacts to Employment – Public and private sector organizations responsible for operating the NPSBN would sustain existing employees and/or hire new employees to carry out operational activities. They would generate a less than significant number of jobs regionally and statewide.

The potential negative impacts on property values mentioned above for deployment of new wireless communication towers and deployable technology storage, staging, and launch/landing areas may also apply in the operations phase. The ongoing presence of such facilities has aesthetic and other effects that may reduce nearby property values, relative to values in the absence of such facilities. These impacts, if they occur, would be less than significant as they would occur within a limited distance of each site, and would be limited to a relatively small number of sites within the region and state. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.9.5 Alternatives Impact Assessment

The following section assesses potential impacts to socioeconomics associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to socioeconomics resulting from implementation of this alternative could be as described below.

Deployment Impacts

As explained above, all deployment activities represent economic activity and thus have socioeconomic impacts. These impacts would primarily be beneficial, such as generation of business income and employee wages, and creation or sustainment of jobs. The impacts would be small for each activity, and therefore less significant.

Deployable technologies such as COWs, COLTs, and SOWs, along with aerial deployable technologies, would require storage, staging, and launch/landing areas. Development or enlargement of these facilities could have adverse impacts on nearby property values. The potential for such impacts is higher under this alternative than the Preferred Alternative because it is likely that these facilities would be implemented in greater numbers and over a larger geographic extent. These potential impacts are anticipated to be less than significant as described above. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Operation Impacts

All operational activities represent economic activity and thus have socioeconomic impacts. These impacts would primarily be beneficial, and because they are small individually, overall impacts would be less than significant.

The ongoing presence of facilities for housing and maintaining deployable technologies may have adverse aesthetic aspects (e.g., large areas of pavement and large numbers of parked vehicles) or other aspects (e.g., noise and traffic) that could negatively affect the value of surrounding properties. The potential for such impacts is higher under this alternative than the Preferred Alternative because it is likely that these facilities would be more numerous, present over a larger geographic extent, and used with greater frequency and duration. These impacts, if they occur, would be less than significant as they would be limited to a relatively small number of sites within the region and state. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed. Therefore, there would be no associated deployment or installation activities to deploy wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to socioeconomics from deployment and operation of the No Action Alternative. Socioeconomic conditions would therefore be the same as those described in Section 11.1.9, Socioeconomics.

11.2.10 Environmental Justice

11.2.10.1 Introduction

This section describes potential impacts to environmental justice in New York associated with construction/deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.10.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on environmental justice were evaluated using the significance criteria presented in Table 11.2.10-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to environmental justice addressed in this section are presented as a range of possible impacts.

11.2.10.3 Description of Environmental Concerns

Effects associated with other Resource Areas that have a Disproportionately High and Adverse Impact on Low-Income Populations and Minority Populations

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Office of the President, 1994), and guidance from CEQ, require federal agencies to evaluate potential human health and environmental effects on environmental justice populations. Specifically, "Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment" (CEQ, 1997). Thus, effects associated with other resource areas are of interest from an environmental justice perspective. This includes Human Health and Safety, Cultural Resources, Socioeconomics, Noise, Aesthetics and Visual Resources, and other resources.

Potential concerns noted in the impact analyses for these resources include dust, noise, traffic, and other adverse impacts of construction activities. New wireless communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013). See Socioeconomics Environmental Consequences for additional discussion. The presence and operation of large storage, staging, and launch/landing areas for deployable technologies could raise environmental justice concerns as described below. Indian tribes are considered environmental justice populations (CEQ, 1997); thus, impacts on tribal cultural resources (for instance, due to construction) could be a concern from an environmental justice perspective.

Impacts are considered environmental justice impacts only if they are both "adverse" and "disproportionately high" in their incidence on environmental justice populations relative to the general population (CEQ, 1997). The focus in environmental justice impact assessments is always, by definition, on adverse effects. However, telecommunications projects, such as those proposed by FirstNet, could have beneficial effects. These effects may include better provision of police, fire, and emergency medical services; improvements in property values; and the generation of jobs and income. These impacts are considered in the Socioeconomics Environmental Consequences.

Construction impacts are localized, and property value impacts of wireless telecommunications projects rarely extend beyond 300 meters (984 feet) of a communications tower (Bond, Sims, & Dent, 2013). In addition, impacts related to deployment are of short duration. The potential for significant environmental justice impacts from the FirstNet deployment activities would be limited. Most, but not all, of the FirstNet operational activities have very limited potential for impacts as these activities are limited in scale and short in their duration.

Table 11.2.10-1: Impact Significance Rating Criteria for Environmental Justice

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Effects associated with other resource areas (e. g., human health and safety, cultural resources, socioeconomics) that have a disproportionately high and adverse impact on low-income populations and minority populations	Magnitude or Intensity	Direct and disproportionately high and adverse effects on environmental justice communities (as defined by EO 12898) that cannot be fully mitigated	Effect that is potentially significant, but with mitigation is less than significant	Direct effects on environmental justice communities (as defined by EO 12898) that are not disproportionately high and adverse, and therefore do not require mitigation	No direct effects on environmental justice communities, as defined by EO 12898
	Geographic Extent	Effects realized within counties at the Census Block Group level		Effects realized within counties at the Census Block Group level	Effects realized within counties at the Census Block Group level
	Duration or Frequency	Persists during the life of the project		Persists for as long as the entire construction phase or a portion of the operations phase	NA

NA = Not Applicable

Before FirstNet deploys projects, additional site-specific analyses to identify specific environmental justice populations and assess specific impacts on those populations may be necessary. Such analyses could tier-off the methodology and results of this PEIS. As discussed in Affected Environment (Section 11.1.10), New York's population has higher percentages of minorities than the region or the nation, and higher rates of poverty than the region. The areas shown in the environmental justice screening map of Section 11.1.10 as having Moderate Potential or High Potential for environmental justice populations would particularly warrant further screening. These areas are fairly evenly distributed across New York. They occur within the largest population concentrations and in the sparsely populated regions of the state. Further analysis using the data developed for the screening analysis in Section 11.1.10 may be useful. In addition, USEPA's EJSCREEN tool and USEPA's lists of environmental justice grant and cooperative agreement recipients may help identify local environmental justice populations (USEPA, 2015aa; USEPA, 2014g).

A site-specific analysis would also evaluate whether an actual environmental justice impact on those populations would be likely to occur. Analysts can use the evaluation presented below under "Activities with the Potential to Have Impacts" as a starting point. Analysts should bear in mind that any such activities that are problematic based on the adverse impact criterion of environmental justice may also have beneficial impacts on those same environmental justice communities.

11.2.10.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could deploy various types of facilities or infrastructure. Depending on the physical nature and location of FirstNet facilities or infrastructure and the specific action, some activities would result in potential impacts to environmental justice communities and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to environmental justice under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Installation of fiber optic cable in existing conduit would be through existing hand holes, pulling vaults, junction boxes,

huts, and POP structures. Activities at these small entry points would be limited and temporary and thus are not likely to produce perceptible changes affecting any surrounding communities. Therefore, they would not affect environmental justice communities.

- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would be conducted electronically through existing infrastructure, and therefore would have no impacts to environmental justice. If physical access is required to light dark fiber, it would likely be through existing hand holes, pulling vaults, junction boxes, huts, and similar existing structures, with no resulting impacts on environmental justice communities.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the deployment of such devices and equipment would not involve new ground disturbance, impacts to environmental justice communities would not occur. Impacts associated with satellite-enabled devices requiring construction activities are addressed below.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact environmental justice, it is anticipated that this activity would have no impact on environmental justice.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to environmental justice for the Preferred Alternative would encompass a range of impacts that could occur as a result of disturbance to communities from construction activities, such as noise, dust, and traffic. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to environmental justice communities include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: New fiber optic cable installation usually requires construction activities such as trenching, plowing (including vibratory plowing), or directional boring, as well as construction of hand holes, pulling vaults, junction boxes, huts, and POP structures. These activities could temporarily generate noise and dust, or disrupt traffic. If such impacts occur disproportionately to environmental justice communities, they would be considered environmental justice impacts.
  - New Build – Aerial Fiber Optic Plant: Pole/structure installation could temporarily generate noise and dust, or disrupt traffic. If these effects occur disproportionately in

environmental justice communities, they would be considered environmental justice impacts.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water would not impact environmental justice because there would be no ground disturbance or other impacts associated with this activity that would adversely impact communities. Associated onshore activities occurring at existing facilities such as staging of equipment and materials, or connection of cables, would be small in scale and temporary; thus, they would not impact environmental justice communities. Construction of new landings and/or facilities onshore to accept submarine cable could temporarily generate noise and dust, or disrupt traffic. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts, there would be no adverse impacts on surrounding communities, and thus no potential for environmental justice impacts. Installation of optical transmission equipment or centralized transmission equipment requiring construction of new utility poles, hand holes, pulling vaults, junction boxes, huts, and POP structures could temporarily generate noise and dust, or disrupt traffic. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures, such as generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads, or access roads requires construction activities that could temporarily generate noise and dust, or disrupt traffic. New communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013). (See Socioeconomics Environmental Consequences for additional discussion.) If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would include mounting or installing equipment (such as antennas) on an existing facility. This activity would be small in scale, temporary, and highly unlikely to produce adverse human health or environmental impacts on the surrounding community. Thus, it would not impact environmental justice communities. If collocation requires construction for additional power units, structural hardening, and physical security measures, the construction activity could temporarily generate noise and dust and disrupt traffic. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

- Deployable Technologies: COWs, COLTs, and SOWs and aerial deployable technologies require storage, staging, and (for aerial deployables) launch and landing areas. To the extent such areas require new construction, noise and dust could be temporarily generated, and traffic could be disrupted. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

In general, the impacts from the abovementioned activities would be short-term and could potentially involve objectionable dust, noise, traffic, or other localized impacts due to construction activities. In some cases, these effects and aesthetic effects could potentially impact property values, particularly from new towers. These impacts are expected to be less than significant, but are problematic from an environmental justice perspective if they occur disproportionately in environmental justice communities. Since environmental justice impacts occur at the site-specific level, analyses of individual proposed projects would help determine potential impacts to specific environmental justice communities. BMPs and mitigation measures may be required to address potential impacts to environmental justice communities at the site-specific level. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

Activities Likely to Have No Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of primarily of routine maintenance and inspection of fixed infrastructure. It is anticipated that such activities would not result in environmental justice impacts, as the intensity of these activities would be low (low potential for objectionable effects such as noise and dust) and their duration would be very short. Routine maintenance and inspection would not adversely affect property values, for the same reasons. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.10.5 Alternatives Impact Assessment

The following section assesses potential impacts to environmental justice associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to environmental justice communities resulting from implementation of this alternative could be as described below.

Deployment Impacts

As explained above, deployable technologies such as COWs, COLTs, and SOWs, along with aerial deployable technologies, could require storage, staging, and launch/landing areas. To the extent such areas require new construction, noise, and dust could be temporarily generated, and traffic could be disrupted. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts. Impacts are expected to be less than significant because they would be temporary in nature. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Operation Impacts

The ongoing presence of facilities for housing and maintaining deployable technologies may have adverse aesthetic aspects (e.g., large areas of pavement and large numbers of parked vehicles) that could negatively affect the value of surrounding properties. In addition, equipment maintenance activities at such facilities may temporarily generate noise, and operational activities may generate traffic. These effects may be adverse in themselves, and may impact property values. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts. Impacts are expected to be less than significant as operations are expected to be temporary in nature. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed. Therefore, there would be no associated construction or installation activities to deploy wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to environmental justice as a result of deployment and operation of the No Action Alternative. Environmental conditions would therefore be the same as those described in Section 11.1.10, Environmental Justice.

11.2.11 Cultural Resources

11.2.11.1 Introduction

This section describes potential impacts to cultural resources in New York associated with deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and

Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.11.2 Impact Assessment Methodology and Significance Criteria

The potential impacts of the Proposed Action on cultural resources were evaluated using the significance criteria presented in Table 11.2.11-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to cultural resources addressed in this section are presented as a range of possible impacts.

11.2.11.3 Description of Environmental Concerns

Physical Damage to and/or Destruction of Historic Properties

One of the primary environmental concerns during deployment activities is damage to or destruction of historic and cultural resources. Deployment involving ground disturbance has the potential to damage or destroy archaeological sites, and the attachment of communications equipment to historic building and structures has the potential to cause damage to features that are historically significant.

Based on the impact significance criteria presented in Table 11.2.11-1, direct deployment impacts could be potentially significant if FirstNet's deployment locations were in areas with moderate to high probabilities for archaeological deposits, within historic districts, or at historic properties. To the extent practicable, FirstNet would attempt to minimize activities in areas with archaeological deposits or within historic districts. However, given that archaeological sites and historic properties are present throughout New York, some deployment activities may be in these same areas, in which case BMPs (see Chapter 17) would help avoid or minimize the potential impacts.

Table 11.2.11-1: Impact Significance Rating Criteria for Cultural Resources

Type of Effect	Effect Characteristics	Impact Level			
		Adverse Effect	Mitigated Adverse Effect[1]	Effect, But Not Adverse	No Effect
Physical damage to and/or destruction of historic properties[2]	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties	Adverse effect that has been procedurally mitigated through Section 106 process	Effects to a non-contributing portion of a single or many historic properties	No direct effects to historic properties
	Geographic Extent	Direct effects APE		Direct effects APE	Direct effects APE
	Duration or Frequency	Permanent direct effects to a contributing portion of a single or many historic properties		Permanent direct effects to a non-contributing portion of a single or many historic properties	No direct effects to historic properties
Indirect effects to historic properties (i.e. visual, noise, vibration, atmospheric)	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties	Adverse effect that has been procedurally mitigated through Section 106 process	Effects to a contributing or non-contributing portion of a single or many historic properties	No indirect effects to historic properties
	Geographic Extent	Indirect effects APE		Indirect effects APE	Indirect effects APE
	Duration or Frequency	Long-term or permanent indirect effects to a single or many historic properties		Infrequent, temporary, or short- or long-term or permanent indirect effects to a single or many historic properties	No indirect effects to historic properties
Loss of character defining attributes of historic properties	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties	Adverse effect that has been procedurally mitigated through Section 106 process	Effects to a non-contributing portion of a single or many historic properties	No direct or indirect effects to historic properties
	Geographic Extent	Direct and/or indirect effects APE		Direct and/or indirect effects APE	Direct and/or indirect effects APE

Type of Effect	Effect Characteristics	Impact Level			
		Adverse Effect	**Mitigated Adverse Effect[1]**	**Effect, But Not Adverse**	**No Effect**
	Duration or Frequency	Long-term or permanent loss of character defining attributes of a single or many historic properties		Infrequent, temporary, or short-term changes to character defining attributes of a single or many historic properties	No direct or indirect effects to historic properties
Loss of access to historic properties	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties	Adverse effect that has been procedurally mitigated through Section 106 process	Effects to a non-contributing portion of a single or many historic properties	No segregation or loss of access to historic properties
	Geographic Extent	Any area surrounding historic properties that would cause segregation or loss of access to a single or many historic properties		Any area surrounding historic properties that could cause segregation or loss of access to a single or many historic properties	No segregation or loss of access to historic properties
	Duration or Frequency	Long-term or permanent segregation or loss of access to a single or many historic properties		Infrequent, temporary, or short-term changes in access to a single or many historic properties	No segregation or loss of access to historic properties

[1] Whereas mitigation measures for other resources discussed in this PEIS may be developed to achieve an impact that is "Less than Significant with Mitigation Incorporated," historic properties are considered to be "non-renewable resources," given their very nature. As such, any and all unavoidable adverse effects to historic properties, per Section 106 of the NHPA (as codified in 36 CFR Part 800.6), would require FirstNet to consult with the SHPO/THPO and other consulting parties, including Indian Tribes and Native Hawaiian Organizations, to develop appropriate mitigation.

[2] Per NHPA, a "historic property" is defined as any district, archaeological site, building, structure, or object that is either listed or eligible for listing in the NRHP. Cultural resources present within a project's APE are not historic properties if they do not meet the eligibility requirements for listing in the NRHP. Sites of religious and/or cultural significance refer to areas of concern to Indian Tribes and other consulting parties that, in consultation with the respective party(ies), may or may not be eligible for listing in the NRHP. These sites may also be considered TCPs. Therefore, by definition, these significance criteria only apply to cultural resources that are historic properties, significant sites of religious and/or cultural significance, or TCPs. For the purposes of brevity, the term historic property is used here to refer to either historic properties, significant sites of religious and/or cultural significance, or TCPs.

Indirect Effects to Historic Properties (i.e., visual, noise, vibration, atmospheric)

The potential for indirect effects to historic properties would be present during deployment of the proposed facilities/infrastructure and during trenching, grading, and/or foundation excavation activities. Indirect effects include the introduction of visual, noise, atmospheric, and/or vibration effects that diminish a property's historic integrity. The greatest likelihood of potentially significant impacts from indirect effects would be from the deployment of equipment in areas that would cause adverse visual effects to historic properties. To the extent practicable, FirstNet would attempt to minimize activities in areas within or adjacent to historic districts or properties.

Loss of Character Defining Attributes of Historic Properties

Deployment of FirstNet equipment has the potential to cause the loss of character defining attributes of historic properties; such attributes are the features of historic properties that define their NRHP eligibility. Examples of such impacts would be the loss of integrity of archaeological sites through ground disturbing activities, and direct impacts to historic buildings from equipment deployment that adversely alter historic architectural features. Significant impacts such as these can be avoided or minimized through BMPs (see Chapter 17).

Loss of Access to Historic Properties

The deployment of equipment requiring a secure area has the potential to cause the loss of access to historic properties. The highest potential for this type of significant impact would be from the deployment of equipment in secure areas that impact the access to sites of cultural importance to Native Americans. It is anticipated that FirstNet would identify potential impacts to such areas by conducting research on particular areas and through the NHPA consultation process, and would minimize deployment activities that would cause such loss of access.

11.2.11.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to cultural resources, while others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to cultural resources under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to cultural resources since the activities that would be conducted at these small entry and exit points are not likely to produce impacts.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to cultural. If required, and if done in existing huts with no ground disturbance, installation of new associated equipment would also have no impacts to cultural resources because there would be no ground disturbance and no perceptible visual changes.
- Satellites and Other Technologies
    - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures, attaching equipment to satellites launched for other purposes, and the use of portable devices that use satellite technology would not impact cultural resources because those activities would not require ground disturbance or create perceptible visual effects.
    - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact cultural resources, it is anticipated that this activity would have no impact on cultural resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to cultural resources as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur as a result of ground disturbance activities, including destruction of cultural or historic artifacts. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to cultural resources include the following:

- Wired Projects
    - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POP, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to cultural resources. Soil disturbance and heavy equipment use associated with plowing, trenching, or directional boring as well as land/vegetation clearing, excavation activities, and landscape grading associated with construction of POPs, huts, or other associated facilities or hand-holes to

access fiber could result in the disturbance of archaeological sites, and the associated structures could have visual effects on historic properties.

- New Build – Aerial Fiber Optic Plant: Ground disturbance during the installation of new utility poles and the use of heavy equipment during the installation of new utility poles and hanging of cables could result in the disturbance of archaeological sites, and the associated structures could have visual effects on historic properties.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water could impact cultural resources, as coastal areas of New York where sea level was lower during glacial periods (generally the Middle Archaic Period and earlier) have the potential to contain archaeological sites, as well as sites associated with the state's significant maritime history since European colonization, such as shipwrecks. Impacts to cultural resources could also potentially occur as result of the construction of landings and/or facilities on shore to accept submarine cable, which could result in the disturbance of archaeological and historical sites, such as wharves and seawalls (archaeological deposits tend to be located in bodies of water, and New York, for example, has numerous maritime archaeological sites associated with its 19th century commercial expansion), and the associated network structures could have visual effects on historic properties.

- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading or other ground disturbance to install small boxes or huts, or access roads, there could potentially be impacts to cultural resources. Ground disturbance could impact archaeological sites, and the associated structures could have visual effects on historic properties. If installation of transmission equipment would occur in existing boxes or huts and require no ground disturbance, there would be no impacts to cultural resources.

- Collocation on Existing Aerial Fiber Optic Plant: Soil excavation and excavated material placement during the replacement of poles and structural hardening could result in direct and indirect effects to cultural resources, although any effects to access would be short-term. Heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in direct and indirect effects to cultural resources.

- Wireless Projects

  - New Wireless Communication Towers: Deployment of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to historic properties. Land/vegetation clearing, excavation activities, landscape grading, and other ground disturbance activities during the deployment of new wireless towers and associated structures or access roads, could result in the disturbance of archaeological sites. The deployment of new wireless communication towers and their associated structures could result in visual impacts to historic properties or the loss of access to historic properties.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower could result in impacts to historic properties. Ground disturbance activities could result in impacts to archaeological sites, and the deployment of collocated equipment could result in visual impacts or physical damage to historic properties, especially in urban areas such as New York City that have larger numbers of historic buildings.

- Deployable Technologies: Implementation of deployable technologies could result in potential impacts to cultural resources if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. In addition, impacts to historic properties could occur if the deployment is long-term, or if the deployment involves aerial technologies with the potential for visual or other indirect impacts.

In general, the abovementioned activities could potentially involve ground disturbance, construction of access roads and other impervious surfaces, landscape grading, and heavy equipment movement. Potential impacts to cultural resources associated with deployment could include physical damage to or destruction of historic properties, indirect impacts including visual effects, the loss of access to historic properties, or the loss of character-defining features of historic properties. These activities could affect, but not adversely affect, cultural resources as the potential adverse effects would be temporary and limited to the area near individual Proposed Action deployment site. Additionally, some equipment proposed to be installed on or near properties that are listed or eligible for listing on the NRHP could potentially be removed. Additionally as appropriate, FirstNet would engage in consultation as required under Section 106 of the NHPA. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major communications infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be less than significant impacts to air quality associated with routine inspections of the Preferred Alternative due to the limited nature of the activity. If usage of heavy equipment as part of routine maintenance or inspections occurs off established access roads or corridors additional air quality impacts may occur, however, they would be less than significant as they would still be limited in nature. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.11.5 Alternatives Impact Assessment

The following section assesses potential impacts to cultural resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to cultural resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in impacts to cultural resources if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in impacts to archaeological sites. These activities could affect, but not adversely affect, cultural resources due to the limited amount of expected ground disturbing activities and the short-term nature of deployment activities. However, in the event that land/vegetation clearing is required, FirstNet would engage in consultation as required under Section 106 of the NHPA. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the deployment impacts, it is anticipated that there would be effects, but no adverse effects to historic properties associated with implementation/running of the deployable technology. No adverse effects would be expected to either site access or viewsheds due to the temporary nature of expected activities. As with the Preferred Alternative, it is anticipated that there would be no effects to cultural resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off established access roads or corridors, impacts to archaeological sites could occur, however, in the event that this is required, FirstNet would engage in consultation as required under Section 106 of the NHPA. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to cultural resources as a result of deployment and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.11, Cultural Resources.

11.2.12 Air Quality

11.2.12.1 Introduction

This section describes potential impacts to New York's air quality from construction/deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.12.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on New York's air quality were evaluated using the significance criteria presented in Table 11.2.12-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to New York's air quality addressed in this section are presented as a range of possible impacts.

Table 11.2.12-1: Impact Significance Rating Criteria for Air Quality

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Increased air emissions	Magnitude or Intensity	Pollutant concentrations would exceed one or more NAAQS in nonattainment and maintenance areas. Emissions in attainment areas would cause an area to be out of attainment for any NAAQS. Projects do not conform to the SIP covering nonattainment and maintenance areas.	Effect that is potentially significant, but with mitigation is less than significant	Negligible emissions would occur for any criteria pollutants within an attainment area but would not cause a NAAQS exceedance.	Action would not cause pollutant concentrations to exceed the NAAQS in nonattainment and maintenance areas. Emissions in attainment areas would not cause air quality to go out of attainment for any NAAQS. Projects are *de minimis* or conform to the SIP covering nonattainment and maintenance areas.
	Geographic Extent/Context	NA		NA	NA
	Duration or Frequency	Permanent or long-term		Short term	Temporary

NA = not applicable

11.2.12.3 Description of Environmental Concerns

Increased Air Emissions

The Proposed Action has the potential to generate air pollutant emissions. These emissions could be above and beyond what is typically generated in a given area and may alter ambient air quality. Deployment activities may involve the use of vehicles, heavy equipment, and other equipment that could emit exhaust and create fugitive dust in localized areas. During operations, routine maintenance and other use of generators at tower facilities may emit exhaust for specific durations (maintenance) or unknown timeframes (if power is lost to a site, for example). Impacts are likely to be less than significant due to the mobile nature of the sources and the temporary and short-term duration of deployment activities. Although unlikely, the emissions of criteria pollutants could impair the air quality of the region and potentially affect human health. Potential impacts to air quality from emissions may occur in areas where the current air quality exceeds, or has a history of exceeding, one or more NAAQS. Areas exist in New York that are in maintenance or nonattainment for one or more criteria pollutants, particularly, ozone is a statewide issue (see Section 11.1.12, Air Quality and Figure 11.1.12-1). There are 10 counties in New York designated as maintenance areas for one or more of the following pollutants: CO_2, PM, and ozone (Table 11.1.12-5); counties located in or near New York City are designated nonattainment or maintenance for two to three NAAQS pollutants (Figure 11.1.12-1).

Based on the significance criteria presented in Table 11.2.12-1, would likely be less than significant given the size and nature of the majority of the proposed deployment activities. The majority of FirstNet's deployment activities would not be located in sensitive areas nor would a large number of emission sources be deployed/operated long-term in the same area from fixed or mobile sources or construction activities. Negligible emissions could occur for any of the criteria pollutants within attainment areas in New York; however, NAAQS exceedances are not anticipated. Given that nonattainment areas are present throughout New York (Figure 11.1.12-1), FirstNet would try to minimize potential emissions where possible and would recommend the implementation of BMPs, where feasible and practicable, to avoid or minimize potential impacts.

11.2.12.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction, deployment, and operation activities.

Deployment and Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementing the Preferred Alternative could result in deploying various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to air quality and others would not. The potential impacts could range from no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to air quality under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Activities associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit. Gaining access to the conduit and installing the cable may result in minor disturbance at entry and exit points, however this activity would be temporary and infrequent, and is not expected to produce any perceptible changes in air emissions.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up dark fiber would require no construction and have no short- or long-term emissions to air quality because it would create no new sources of emissions.
- Satellites and Other Technologies
    - Satellite Enabled Devices and Equipment: The duration of construction activities associated with installing permanent equipment on existing structures would most likely be short-term. It is anticipated that insignificant concentrations of criteria pollutants would be emitted during installment of this equipment from the use of machinery. Deployment and operation of satellite-enabled devices and portable equipment are expected to have minimal to no impact on ambient air quality concentrations.
    - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact air quality resources, it is anticipated that this activity would have no impact on those resources.

Activities with the Potential to Impact Air Quality

Construction, deployment, and operation activities related to the Preferred Alternative could impact air quality by generating various quantities of criteria air pollutant emissions. It is expected that such impacts would be less than significant due to the shorter duration and localized nature of the activities. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to air quality include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber as well as land/vegetation clearing, excavation activities, and landscape grading could result in fugitive dust and products of combustion from the use of vehicles and heavy equipment.
  - New Build – Aerial Fiber Optic Plant: The use of heavy equipment during the installation of new poles and hanging cables, as well as constructing access roads, POPs, huts, or other associated facilities to house plant equipment could result in products of combustion from the use of vehicles and machinery, as well as fugitive dust emissions from site preparation.
  - Collocation on Existing Aerial Fiber Optic Plant: Excavation equipment used during pole replacement, and other heavy equipment used for structural hardening or reinforcement, could result in products of combustion from the use of vehicles and heavy equipment, as well as fugitive dust from site preparation.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water could generate products of combustion from vessels used to lay the cable. In addition, the construction of landings and/or facilities on shore to accept submarine cable could result in products of combustion and fugitive dust from heavy equipment used for grading, foundation excavation, or other ground disturbing activities.
  - Installation of Optical Transmission or Centralized Transmission Equipment: Emissions associated with the installation of optical transmission or centralized transmission equipment would be limited to the short-term, temporary use of vehicle and construction equipment. Long-term impacts are unlikely, as the power requirements for optical networks are relatively low.
- Wireless Projects
  - New Wireless Communication Towers: Activities associated with installing new wireless towers and associated structures (e.g., generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in products of combustion. Operating vehicles and other heavy equipment, running generators while conducing excavation activities, and landscape grading to install new wireless towers and associated structures or access roads could result in products of combustion and fugitive dust.
  - Collocation on Existing Wireless Tower, Structure, or Building: Vehicles and equipment used to mount or install equipment, such as antennas or microwave dishes, on an existing tower could impact air quality. If the onsite delivery of additional power units, structural

hardening, and physical security measures required grading or excavation, then exhaust and fugitive dust from heavy equipment used for these activities could also result in increased air emissions.

- Deployable Technologies: The type of deployable technology used would dictate the types of air pollutants generated. For example, mobile equipment deployed via heavy trucks could generate products of combustion from the internal combustion engines associated with the vehicles and onboard generators. These units may also generate fugitive dust depending on the type of road traveled during deployment (i.e., paved versus unpaved roads). Aerial platforms (e.g., UASs or other aircraft) would generate pollutants during all phases of flight.

In general, the pollutants of concern from the abovementioned activities would be products of combustion from burning fossil fuels in internal combustion engines and fugitive dust from site preparation activities and vehicles traveling on unpaved road surfaces. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the construction impacts. These impacts are anticipated to be less than significant. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.12.5 Alternatives Impact Assessment

The following section assesses potential impacts to air quality associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific equipment associated with the Deployable Technologies Alternative could include heavy trucks with onboard generators, aerial vehicles (e.g., UASs or other aircraft), and ground support vehicles and other equipment for aerial deployment. The stand-alone Deployable Technologies Alternative differs from the Preferred Alterative in the number of mobile and aerial vehicles likely to deploy, the distances traveled from storage locations, and the duration of deployment. The potential impacts to air quality are as follows:

Deployment and Operation Impacts to Air Quality

Implementing deployable technologies could result in products of combustion from mobile equipment deployed via heavy trucks using internal combustion engines associated with the vehicles and onboard generators. While a single deployable vehicle may have an insignificant impact, multiple vehicles operating for longer periods, in close proximity, may have a greater cumulative impact, although this is expected to be less than significant based on the defined significance criteria, since activities would be temporary and short-term. These vehicles may also produce fugitive dust if traveling on unpaved roads. Some staging or landing areas (depending on the type of technology) may require excavation, site preparation, and paving. Heavy equipment used for these activities could emit products of combustion as a result of burning fossil fuels in internal combustion engines. The deployment and operation of aerial technology is anticipated to generate pollutants during all phases of flight, except for balloons. The concentrations and associated impacts would be dictated by the products of combustion from ground support vehicles, as well as the duration of ground support operations and travel between storage and deployment locations. Additionally, routine maintenance and inspections of the deployable technologies are anticipated to be less than significant, given that these activities are of low-intensity and short duration.

No Action Alternative

Under the No Action Alternative, FirstNet would not deploy the NPSBN and there would be no impact to ambient air quality. By not deploying NPSBN, FirstNet would avoid generating emissions from construction, installation, or operation of wired, wireless, or deployable infrastructure or technologies; satellites; and other technologies.

11.2.13 Noise

11.2.13.1 Introduction

This section describes potential noise impacts from construction, deployment, and operation of the Proposed Action and Alternatives in New York. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.13.2 Impact Assessment Methodology and Significance Criteria

The noise impacts of the Proposed Action were evaluated using the significance criteria presented in Table 11.2.13-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential noise impacts to New York addressed in this section are presented as a range of possible impacts.

Table 11.2.13-1: Impact Significance Rating Criteria for Noise

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs And Mitigation Measures Incorporated**	**Less than significant**	**No impact**
Increased noise levels	Magnitude or Intensity	Noise levels would exceed typical noise levels from construction equipment and generators. Noise levels at noise sensitive receptors (such as residences, hotels/motels/inns, hospitals, and recreational areas) would exceed 55 dBA or specific state noise limits. Noise levels plus baseline noise levels would exceeds 10 dBA increase from baseline noise levels (i.e., louder). Project noise levels near noise receptors at National Parks would exceed 65 dBA.	Effect that is potentially significant, but with mitigation is less than significant.	Noise levels resulting from project activities would exceed natural sounds, but would not exceed typical noise levels from construction equipment or generators.	Natural sounds would prevail. Noise generated by the action (whether it be construction or operation) would be infrequent or absent, mostly immeasurable.
	Geographic Extent/Context	County or local		County or local	County or local
	Duration or Frequency	Permanent or long-term		Short term	Temporary

11.2.13.3 Description of Environmental Concerns

Increased Noise Levels

The Proposed Action has the potential to generate noise during construction and operation of various equipment used for deployment. These noise levels could be above what is typically generated in a given area and may alter the ambient acoustical environment. If significant, the noise could cause impacts on residential areas, or other facilities that are sensitive to noise, such as churches, hospitals, or schools. The construction activities for deploying some of the various equipment evaluated under the Proposed Action could cause short-term impacts to nearby populations. However, it is likely that there would be less long-term effects from operational use of the proposed equipment.

Based on the significance criteria presented in Table 11.2.13-1, noise impacts would likely be less than significant given the size and nature of the majority of the proposed deployment activities. The majority of FirstNet's deployment activities would not be located in sensitive areas nor would a large number of noise sources be deployed/operated long-term in the same area. Noise levels from deployment activities are not expected to exceed typical noise levels for short-term/temporary construction equipment or generators. To the extent practicable, FirstNet would attempt to mitigate or minimize noise effects during construction or operation. BMPs and mitigation measures would be followed to limit impacts on nearby noise-sensitive receptors. However, given that much of the concentration and setup of equipment would often occur in populated areas, FirstNet operations would not be able to completely avoid noise impacts due to construction and operations at various receptors.

11.2.13.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction, deployment, and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementing the Preferred Alternative could result in deploying various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential noise impacts and while others would not.

In addition, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no noise impacts under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Noise generated by equipment required to install fiber would be infrequent and of short duration, and is not expected to create perceptible impacts.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up dark fiber would require no construction or installation activities, and therefore would have no noise impacts.
- Satellites and Other Technologies
  - Satellite Enabled Devices and Equipment: The duration of construction activities associated with installing permanent equipment on existing structures would most likely be short-term. It is anticipated that insignificant levels of noise would be emitted during installment of this equipment. Noise caused by these construction and installation activities would be similar to other construction activities in the area, such as the installation of cell phone towers or other communication equipment. Deployment and operation of satellite-enabled devices and equipment are expected to have minimal to no impact on the noise environment.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact noise resources, it is anticipated that this activity would have no impact on those resources.

Activities with the Potential for Noise Impacts

Construction, deployment, and operation activities related to the Preferred Alternative could create noise impacts from either the construction or operation of the infrastructure. The types of infrastructure deployment scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to air quality include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber as well as land/vegetation clearing, excavation activities, and landscape grading could result in high noise levels from the use of heavy equipment and machinery.

- New Build – Aerial Fiber Optic Plant: The use of heavy equipment during the installation of new poles and hanging cables, as well as constructing access roads, POP huts, or other associated facilities to house plant equipment would be short-term and could result in increased noise levels from the use of vehicles and machinery.

- Collocation on Existing Aerial Fiber Optic Plant: Excavation equipment used during potential pole replacement, and other heavy equipment used for structural hardening or reinforcement, could result in temporary increases in noise levels from the use of heavy equipment and machinery.

- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Installation of new associated huts or equipment, if required, could result in short-term and temporarily higher noise levels if the activity required the use of heavy equipment for grading or other purposes.

- New Build – Submarine Fiber Optic Plant: The installation of cables in limited nearshore and inland bodies of water could generate noise if vessels are used to lay the cable. In addition, the construction of landings and/or facilities on shore to accept submarine cable could result in short-term and temporarily increased noise levels to local residents and other noise sensitive receptors from heavy equipment used for grading, foundation excavation, or other ground disturbing activities.

- Installation of Optical Transmission or Centralized Transmission Equipment: Noise associated with the installation of optical transmission or centralized transmission equipment would be limited to the short-term, temporary use of vehicle and construction equipment. Long-term impacts are unlikely, as the noise emissions from optical networks are relatively low. Heavy equipment used to grade and construct access roads could generate increased levels of noise over baseline levels temporarily.

- Wireless Projects

  - New Wireless Communication Towers: Activities associated with installing new wireless towers and associated structures (e.g., generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in localized construction noise. Operating vehicles, other heavy equipment, and generators would be used on a short-term basis and could increase noise levels.

  - Collocation on Existing Wireless Tower, Structure, or Building: Vehicles and equipment used to mount or install equipment, or to grade or excavate additional land on sites for installation of equipment, such as antennas or microwave dishes on an existing tower, could impact the local noise environment temporarily.

- Deployable Technologies: The type of deployable technology used would dictate the types of noise generated. For example, mobile equipment deployed via heavy trucks could generate noise from the internal combustion engines associated with the vehicles and onboard generators. With the exception of balloons, aerial platforms (e.g., UASs or other aircraft, except balloons) generate noise during all phases of flight, including takeoff, landing, and flight operations over necessary areas that could impact the local noise environment.

In general, noise from the abovementioned activities would be products of site preparation, installation, and construction activities, as well as additional construction vehicles traveling on nearby roads and localized generator use. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the construction impacts. These impacts are expected to be less than significant due to the temporary duration of deployment activities. Additionally, pre-existing noise levels achieved after some months (typically less than a year but could be a few hours for linear activities such as pole construction). Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Operation Impacts

Operation activities associated with the Preferred Alternative would be less than significant and for routine maintenance and inspection of the facilities because of the temporary nature of the activities which would not create new permanent sources of noise. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that potential noise impacts would be similar to or less than those described for the deployment activities. If usage of vehicles or heavy equipment as part of routine maintenance or inspections or onsite generator use occurs, potential noise impacts could result as explained above. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.13.5 Alternatives Impact Assessment

The following section assesses potential noise impacts associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific equipment associated with the Deployable Technologies Alternative would be heavy trucks with onboard generators, aerial vehicles (e.g., UASs or other aircraft), and ground support vehicles and equipment for aerial deployment. The stand-alone Deployable Technologies Alternative differs from the Preferred Alterative in the number of mobile and aerial vehicles likely to deploy, the distances traveled from storage locations and the duration of deployment. The potential noise impacts are as follows:

Deployment Impacts

Implementing deployable technologies could result in noise from mobile equipment deployed via heavy trucks, including not only onboard generators, but also the vehicles themselves. While a single deployable vehicle may have an insignificant impact, multiple vehicles operating for longer periods, in close proximity, may increase localized noise levels. Several vehicles traveling together could also create short-term noise impacts on residences or other noise-sensitive receptors as they pass by. With the exception of balloons, the deployment of aerial technology is anticipated to generate noise during all phases of flight. Aerial technologies would have the highest level of noise impact if they are required to fly above residential areas, areas with a high concentration of noise-sensitive receptors (i.e., schools or churches), or over national parks or other areas where there is an expectation of quiet and serenity on their way to their final destinations. Residences near deployment areas for aerial technologies (i.e., airports or smaller airfields) could also be affected during takeoff and landing operations. Additionally, routine maintenance and inspections of the deployable technologies are anticipated to be less than significant, given that these activities are of low-intensity and short duration. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

Operation activities associated with the Deployable Technologies Alternative would be similar to several of the deployment activities related to routine maintenance and inspection of the facilities. Operation of generators could also generate noise in the area. However, deployable technologies could be deployed to areas with few existing facilities, so noise impacts could be minimal in those areas. It is anticipated that potential noise impacts would be the same as those described for the deployment activities. If usage of vehicles or heavy equipment as part of routine maintenance or inspections occurs, potential noise impacts could result as explained above.

Operational impacts from aerial technologies would include repeated flyovers by UAS vehicles while they are needed in the area. This could generate less than significant short-term impacts on any residential areas or other noise-sensitive receptors under the flight path of these vehicles. However, once these operations cease, noise levels would quickly return to baseline levels. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, FirstNet would not deploy the NPSBN and there would be no impact to ambient noise. By not deploying the NPSBN, FirstNet would avoid generating noise from construction, installation, or operation of wired, wireless, deployable infrastructure or satellites and other technologies.

11.2.14 Climate Change

11.2.14.1 Introduction

This section describes potential impacts to climate and climate change-vulnerable resources in New York associated with deployment and operation of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.14.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on climate and potential climate change impacts on the Proposed Action's installations and infrastructure were evaluated using the significance criteria presented in Table 11.2.14-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to climate and climate change-vulnerable resources addressed in this section are presented as a range of possible impacts.

CEQ requires the consideration of climate change from two perspectives. The first is the potential for impacts on climate change through GHG emissions resulting from the Proposed Action or Alternatives. The second is related to the implications and possible effects of climate change on the environmental consequences of the Proposed Action or Alternatives. This extends to the impacts of climate change on facilities and infrastructure that would be part of the Proposed Action or Alternatives (CEQ, 2014).

CEQ has established the significance criteria for GHG emissions at 25,000 MT CO_2e on an annual basis, with the requirement that if projected emissions exceed this threshold, a GHG emissions quantitative analysis is warranted (CEQ, 2014). Although 25,000 MT is a very small fraction (one 266,920th) of the total U.S. emissions of 6,673 MMT in 2013 (USEPA, 2015ai), the sum of additional emissions as a consequence of the deployment of FirstNet, combined with multiple new sources of CO_2 and other GHGs from other projects and human activities, could be significant.

CEQ guidance for the consideration of effects of climate change on the environmental consequences of the Proposed Action is more general. In addition to the consideration of climate change's effects on environmental consequences, it also includes the impact that climate change may have on the projects themselves (CEQ, 2014). Projects located in areas that are vulnerable to the effects of climate change (e.g., sea level rise) may be at risk. Analysis of these risks through the NEPA process can provide useful information to the project planning to ensure these projects are resilient to the impacts of climate change.

Table 11.2.14-1: Impact Significance Rating Criteria for Climate

Type of Effect	**Effect Characteristics**	**Impact Level**			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Contribution to climate change through GHG emissions	Magnitude or Intensity	Exceedance of 25,000 metric tons of CO_2e/year, and global level effects observed	Effect that is potentially significant, but with mitigation is less than significant.	Only slight change observed	No increase in greenhouse gas emissions or related changes to the climate as a result of project activities.
	Geographic Extent/Context	Global impacts observed		Global impacts observed	NA
	Duration or Frequency	Long-term changes. Changes cannot be reversed in a short term		Changes occur on a longer time scale. Changes cannot be reversed in the short term	NA
Effect of climate change on FirstNet installations and infrastructure	Magnitude or Intensity	Climate change effects (such as sea level rise or temperature change) negatively impact FirstNet infrastructure	Effect that is potentially significant, but with mitigation is less than significant.	Only slight change observed	No measurable impact of climate change on FirstNet installations or infrastructure
	Geographic Extent	Local and regional impacts observed		Local and regional impacts observed	NA
	Duration or Frequency	Long-term changes. Changes cannot be reversed in a short term		Changes occur on a longer time scale. Changes cannot be reversed in the short term	NA

NA = not applicable

11.2.14.3 Projected Future Climate

Climate model forecasts of future temperatures are highly dependent on emissions scenarios (low versus high), particularly in projections beyond 2050. By mid-century, the total number of days above 90 ºF is projected to increase in the majority of the Northeastern states especially the southern portion of the region. Under both low and high GHG emissions scenarios, the frequency, intensity, and duration of heat waves (sequential days with temperatures over 90 ºF) is also expected to increase, with the most intense heat waves occurring under higher emissions scenarios. Increases in temperature would also impact precipitation events, sea level rise, and ocean water acidity (USGCRP, 2014b).

Air Temperature

Figure 11.2.14-1 and Figure 11.2.14-2 illustrate the anticipated temperature changes for low and high GHG emission scenarios for New York from a 1969 to 1971 baseline.

Cfa – Figure 11.2.14-1 shows that by mid-century (2040 to 2059), temperatures in the entire state of New York under a low emissions scenario would increase by approximately 4 °F, and by the end of the century (2080 to 2099) under a low emissions scenario temperatures in New York would increase by approximately 6° F.

Figure 11.2.14-2 shows that under a high emissions scenario for the period (2040 to 2059), temperatures would increase by approximately 5 °F. Under a high emissions scenario for the period (2080 to 2099) in the (Cfa) region of New York, temperatures would increase by approximately 8° F (USGCRP, 2009).

Dfa – Temperatures in this region are expected to increase by mid-century (2040 to 2059) and by the end of the century (2080 to 2099) at the same rate as the (Cfa) region under both low and high emissions scenarios.

Dfb – Temperatures in this region are expected to increase by mid-century (2040 to 2059) at the same rate as the (Cfa) and (Dfa) region in both a low emission and high emissions scenario. By the end of the century (2080 to 2099, temperatures would increase at the same rate as the (Cfa) and (Dfa) regions of New York.

By the end of the century (2080 to 2099), under a high emissions scenario, the majority of the (Dfb) region temperatures would increase by approximately 8 °F. Temperatures in the upper portion of the (Dfb) region in New York would increase by more than 8 °F (USGCRP, 2009).

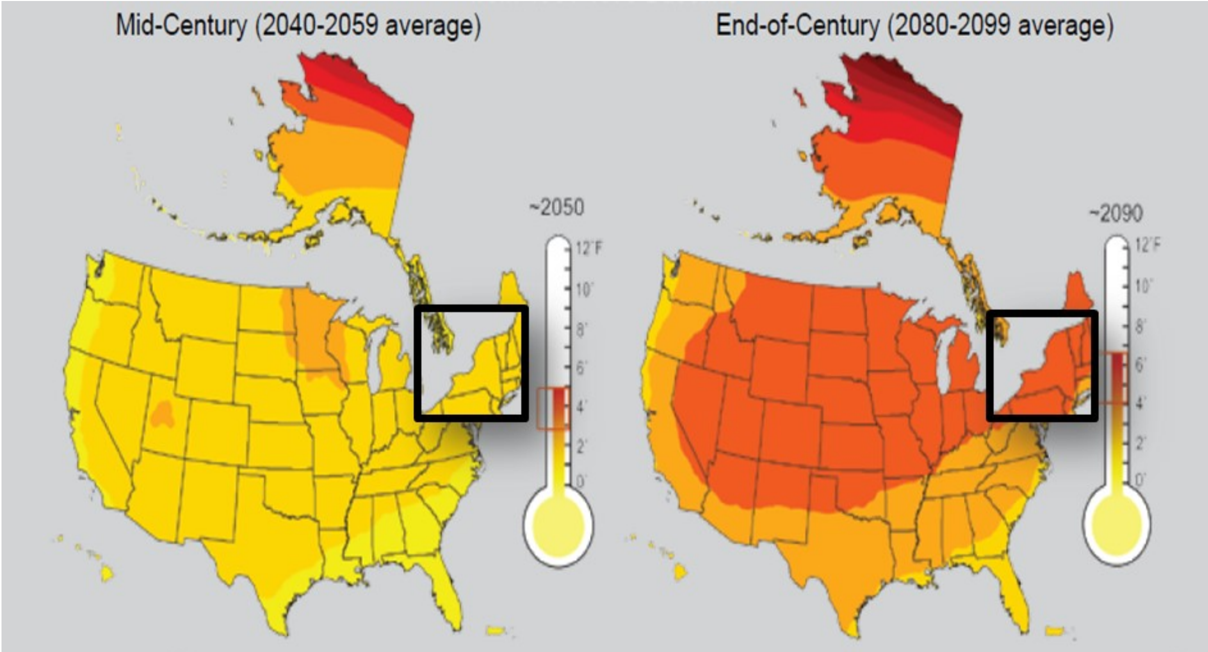

Figure 11.2.14-1: New York Low Emission Scenario Projected Temperature Change

Source: (USCRP, 2009b).

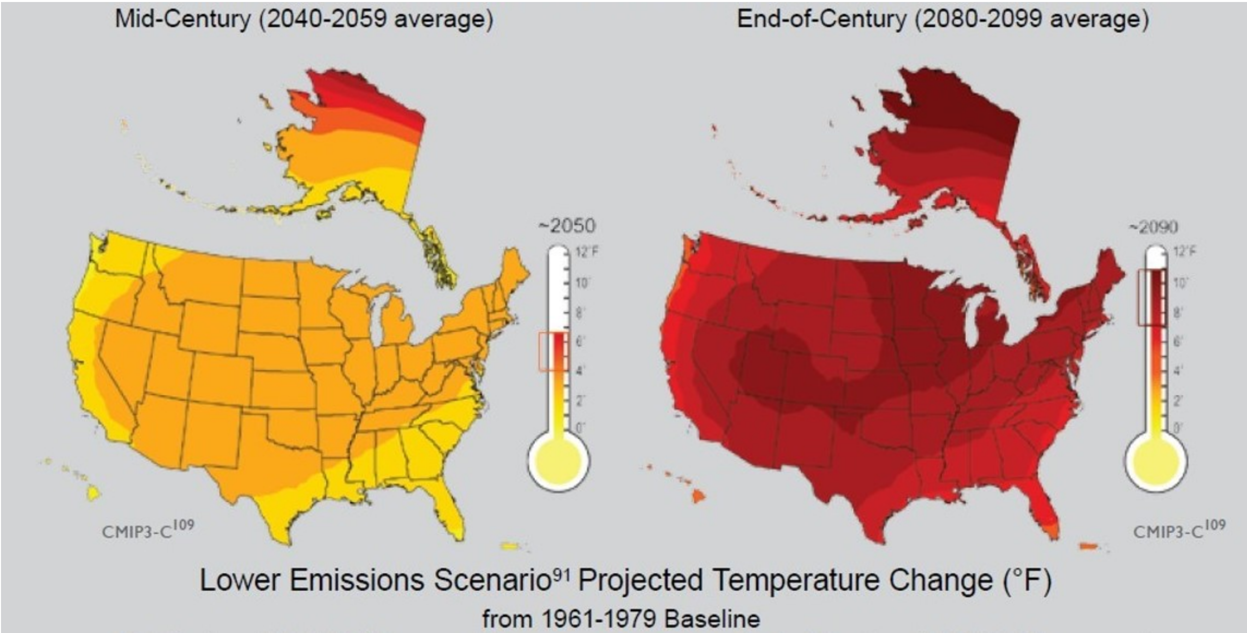

Figure 11.2.14-2: New York High Emission Scenario Projected Temperature Change

Source: (USGCRP, 2009)

Precipitation

By late in the century under a high emissions scenario, winters in the Northeast are projected to be much shorter with fewer cold days and more precipitation. Winter and spring precipitation are projected to increase, and the frequency of heavy downpours is projected to continue to increase as the century progresses. Seasonal drought risk is also projected to increase in summer and fall as higher temperatures lead to greater evaporation and earlier winter and spring snowmelt (USCRP, 2009b).

Figure 11.2.14-3 and Figure **11.2.14-4 show predicted seasonal precipitation change for an approximate 30-year period of 2071 to 2099 compared to a 1970 to 1999 approximate 30-year baseline.**

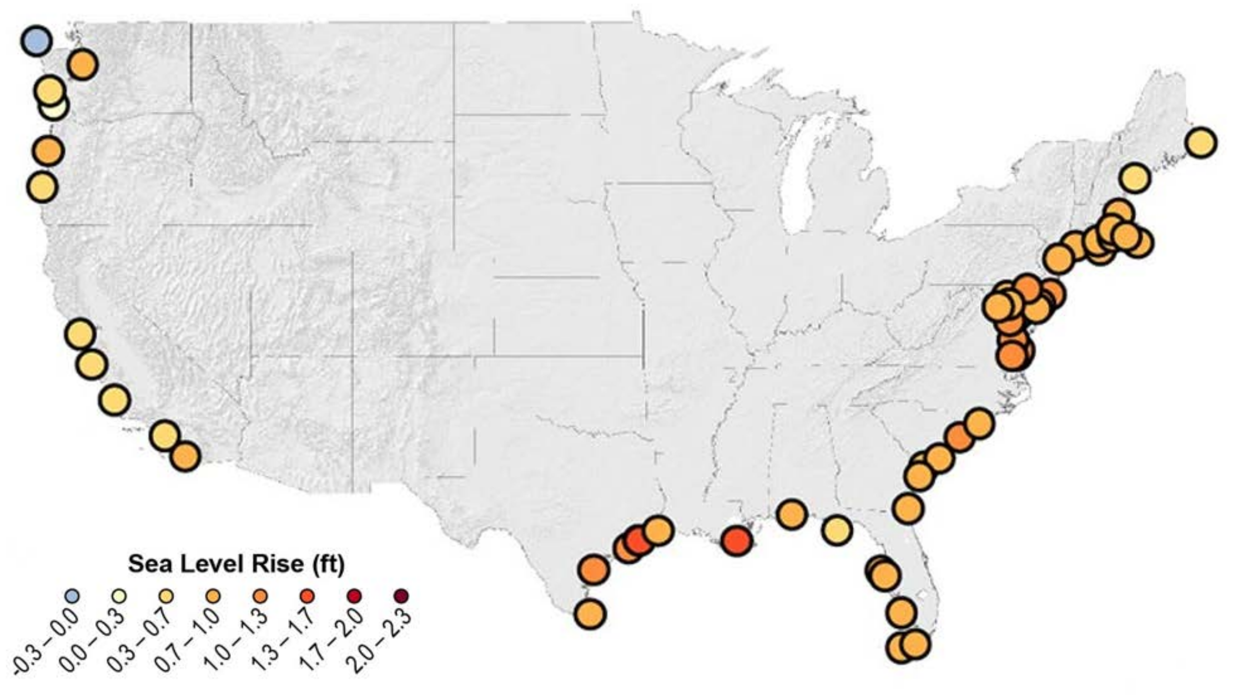

Figure 11.2.14-5 shows seasonal changes in a low emissions scenario, which assumes rapid reductions in emissions where rapid reductions means more than 70 percent cuts from current levels by 2050 (USGCRP, 2014c).

Figure 11.2.14-3 shows a high emissions scenario, which assumes continued increases in emissions, with associated large increases in warming and major precipitation changes. Continued increases in emissions would lead to large reductions in spring precipitation in the Northeast (Note: white areas in the figures indicate that the changes are not projected to be larger than could be expected from natural variability) (USGCRP, 2014c).

Cfa - Figure 11.2.14-4 shows that in a rapid emissions reduction scenario in the 30-year period for 2071 to 2099, precipitation would increase by 10 percent in winter and spring for New York. However, there are no expected increases in precipitation in fall other than fluctuations due to natural variability (USGCRP, 2014c).

Figure 11.2.14-3 shows that if emissions continue to increase, winter precipitation could increase as much as 30 percent over the period 2071 to 2099. In spring, precipitation in this scenario could increase as much as 20 percent. No significant change to fall and summer rainfall is anticipated over the same period (USGCRP, 2014c).

Dfa – Precipitation changes for the Dfa region are consistent with projected changes for the Cfa region of New York in both low and high GHG emissions scenarios, with the exception of small increases in precipitation that would occur in fall and summer on the east coast of the state.

Dfb – Precipitation changes for the Dfb region are consistent with projected changes for the Dfa region of New York in both low and high emissions scenarios.

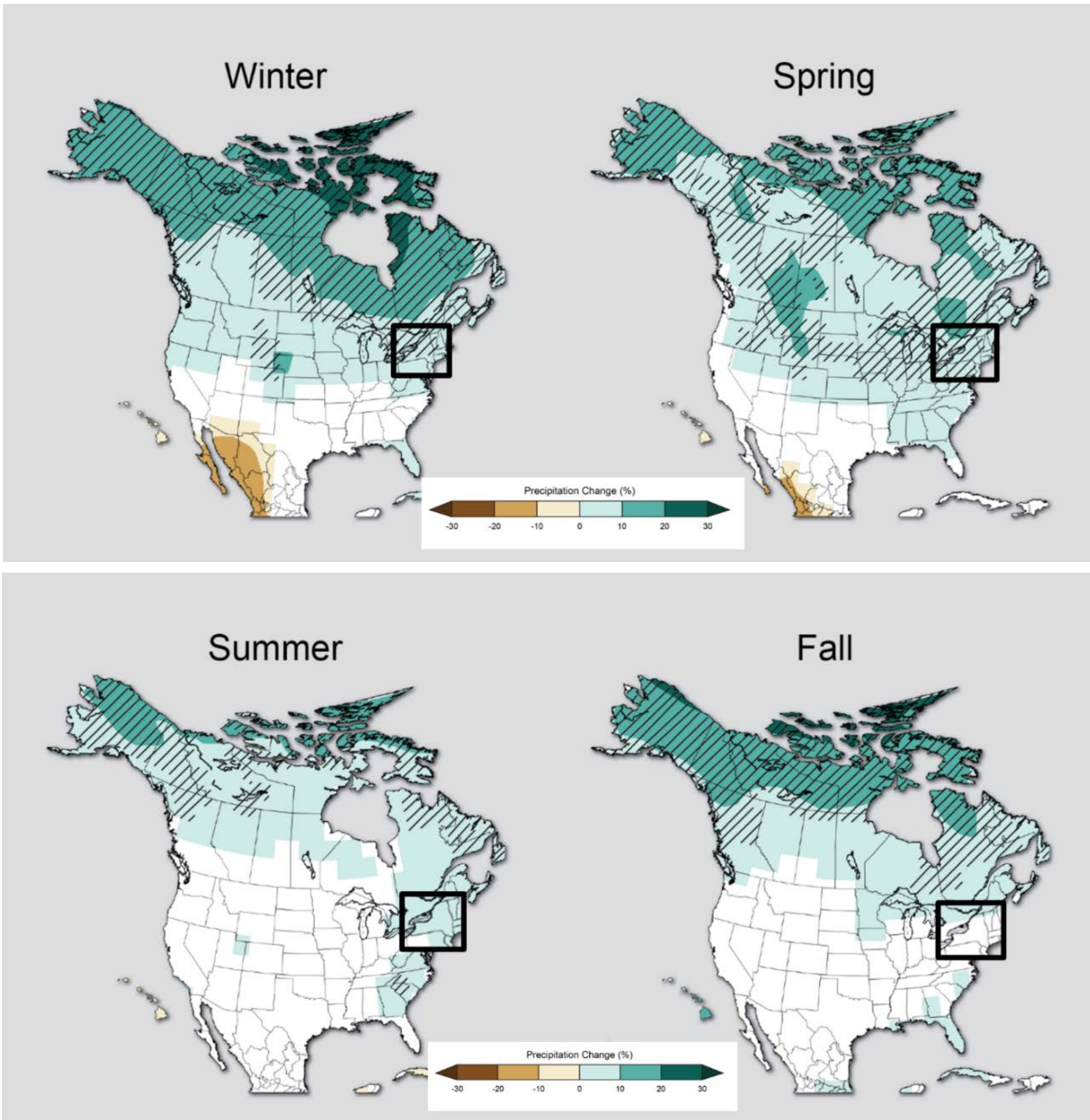

Figure 11.2.14-3: Predicted Seasonal Precipitation Change for 2071 to 2099 Compared to 1970 to 1999 Baseline in a Low Emissions Scenario

Source: (USGCRP, 2014c)

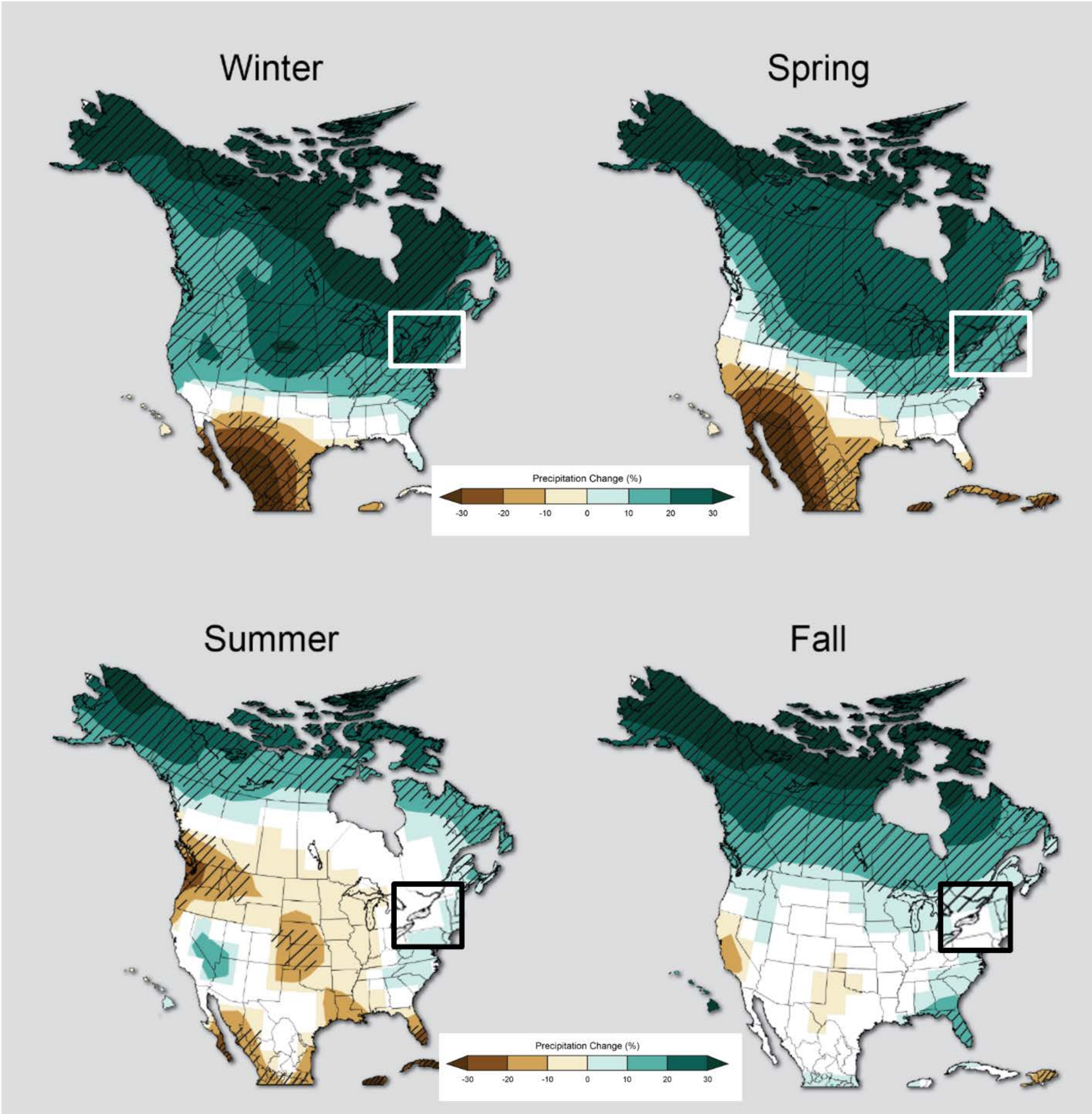

Figure 11.2.14-4: Predicted Seasonal Precipitation Change for 2071 to 2099 Compared to 1970 to 1999 Baseline in a High Emissions Scenario

Source: (USGCRP, 2014c).

Sea Level

Several factors would continue to affect sea level rise in the future. Glacier melt adds water to the ocean, and increasing ocean temperatures result in thermal expansion. Worldwide, "glaciers have generally shrunk since the 1960s, and the rate at which glaciers are melting has accelerated over the last decade. The loss of ice from glaciers has contributed to the observed rise in sea level" (USEPA, 2012i). When water warms, it also expands, which contributes to sea level rise in the world's oceans. "Several studies have shown that the amount of heat stored in the ocean has increased substantially since the 1950s" (USEPA, 2012i). Sea level and currents can be influenced by the amount of heat stored in the ocean (USEPA, 2012i).

The amount of sea level rise would vary in the future along different stretches of the U.S. coastline and under different absolute global sea level rise scenarios. Variation in sea level rise along different stretches of coast is mostly due to varying rates of land subsidence (also known as relative sea level rise). In the National Climate Assessment potential sea level rise scenarios were reported. These scenarios were developed based on varying degrees of ocean warming and ice sheet loss as estimated by organizations like IPCC (NOAA; USGS; SERPD; and USACE, 2012).

Figure 11.2.14-5 and Figure 11.2.14-6 shows feet of sea level above 1992 levels at different tide gauge stations. Figure 11.2.14-5 shows an 8 inch global sea level rise above 1992 levels by 2050 and Figure 11.2.14-6 shows a 1.24 foot global sea level rise above 1992 levels by 2050 (USGCRP, 2014d).

Cfa – Figure 11.2.14-5 presents an 8-inch global average sea level rise above 1992 levels, resulting in a 0.7 to 1 foot sea level rise in 2050 along the coast of New York. Figure 11.2.14-6 indicates that a 1.24-foot sea level rise above 1992 level would result in a 1.3 to 1.7 foot sea level rise in 2050 along the coast of New York (USGCRP, 2014d).

Dfa and *Dfb* – These New York regions are not affected by sea level rise.

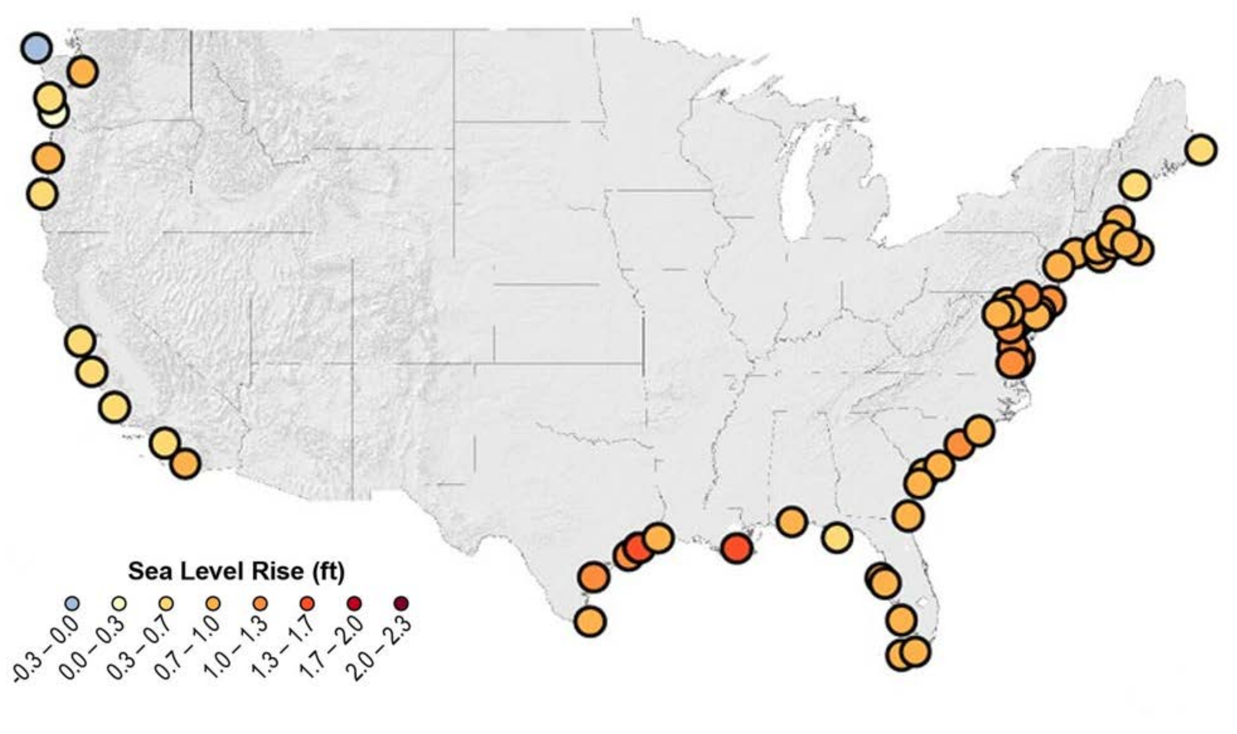

Figure 11.2.14-5: 8-inch Sea Level Rise Above 1992 Levels by 2050

Source: (USGCRP, 2014d)

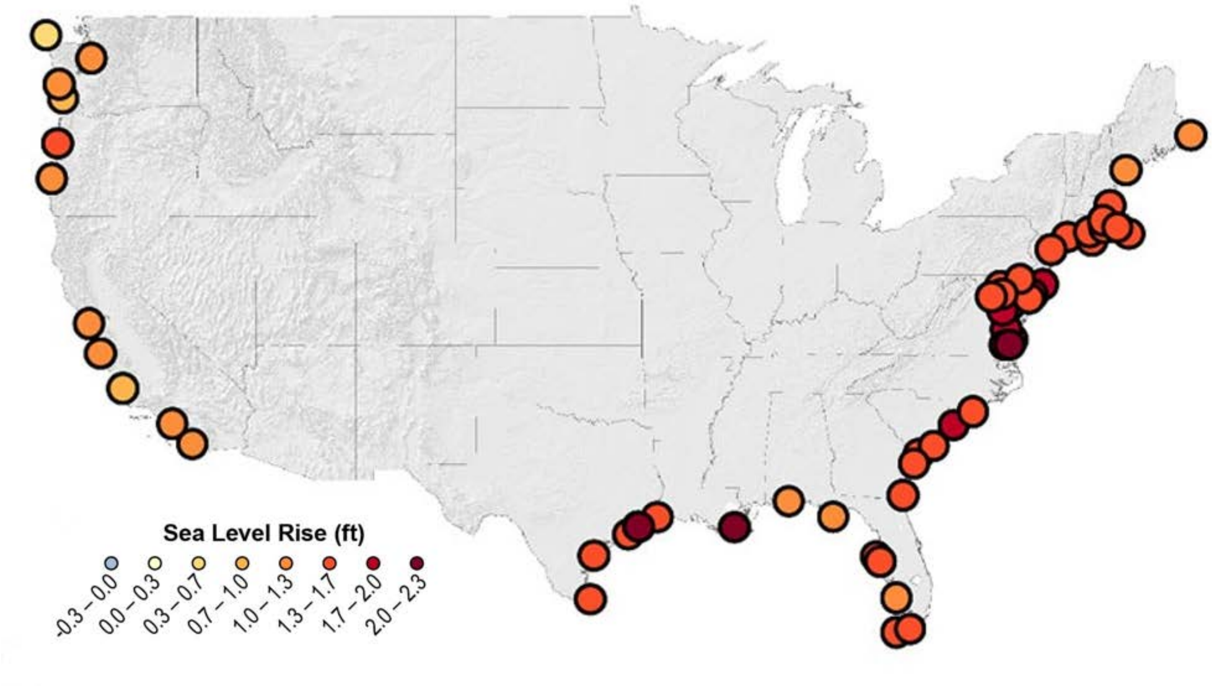

Figure 11.2.14-6: 1.24-foot Sea Level Rise Above 1992 Levels by 2050

Source: (USGCRP, 2014d).

Severe Weather Events

It is difficult to forecast the impact of climate change on severe weather events such as thunderstorms and hurricanes. Trends in thunderstorms and hurricanes are subject to greater uncertainties than trends in temperature and associated variables directly related to temperature such as sea level rise. Climate scientists are studying the influences of climate change on severe storms such as hurricanes. Recent research has yielded insights into the connections between warming and factors that cause severe storms. For example, atmospheric instability and increases in wind speed with altitude link warming with tornadoes and thunderstorms. Additionally, research has found a link between warming and conditions favorable for severe thunderstorms. However, more research is required to make definitive links between severe weather events and climate change (USGCRP, 2014e).

U.S. coastal waters are expected to experience more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of storms that make landfall) (USGCRP, 2014e). Changes in hurricane intensity are difficult to project because there are contradictory effects at work. Warmer oceans increase storm strength with higher winds and increased precipitation. However, changes in wind speed and direction with height are also projected to increase in some regions; this tends inhibit storm formation and growth. Current research suggests stronger, more rain-producing tropical storms and hurricanes are generally more likely, though such storms may form less frequently; ultimately, more research would provide greater certainty (USGCRP, 2014e).

11.2.14.4 Description of Environmental Concerns

Greenhouse Gas Emissions

Increases in GHG emissions have altered the global climate, leading to generalized temperature increases, weather disruption, increased droughts and heatwaves, and may have potentially catastrophic long-term consequences for the environment. Although GHGs are not yet regulated by the federal government, many states have set various objectives related to reducing GHG emissions, particularly CO_2 emissions from fossil fuels.

Based on the impact significance criteria presented in Table 11.2.14-1, climate change impacts as a result of GHG emissions could be significant and require a quantitative analysis if FirstNet's deployment of technology was responsible for increased emissions of 25,000 MT/year or more. The GHG emissions resulting from FirstNet activities fall into two categories: short-term and long-term. Short-term emissions could be associated with deployment activities (vehicles and other motorized construction equipment) and would have no long-term or permanent impact on GHG emissions or climate change. Long-term (both temporary and permanent) emission increases could result from operations, including the use of grid-provided electricity by FirstNet equipment such as transmitters and optical fiber, and from the temporary use of portable or onsite electric generators (a less efficient, more carbon-intensive source of electricity), during emergency situations when the electric grid was down, for example after a hurricane.

A single large cell tower would typically require 20-60kW of power to operate (Balshe, 2011). The CO_2 emissions associated with the operation of the tower would depend on whether it was supplied by a stand-alone power source, such as a generator, or from the grid, and whether it was operating at full power on a continuous basis. A standard 60kW 3-phase diesel generator consumes approximately 5.0 gallons of diesel per hour (Multiquip, 2015). Diesel fuel combustion emits 22.38 lbs of CO_2 per gallon (EIA, 2015n). A 60kW transmitter running on a generator would therefore be responsible for 1,221 kg of CO_2/day. Running continuously, the tower would cause the emission of 446 MT of CO_2 per year.

However, grid-provided electricity is less carbon-intensive, and would generate approximately 240 MT of CO_2 per year for the same equipment, depending on the region of the U.S. where the electricity was generated (USEPA, 2014h). Furthermore, the components of the system would not necessarily all be this large, running all the time, or at full power. Some may even run on low/no-emissions renewable energy. Therefore, this scenario is a "worst-case" for GHG emissions. If the system deployment resulted in the operation of more than 50 60 kW towers operating at maximum power in remote locations on diesel generators on a continuous basis, the 25,000 MT/year threshold may be exceeded and a quantitative analysis required. By comparison, optical fiber is considerably more energy efficient and consumes considerably less power than transmitters (Willem Vereecken, 2011), and would not impact GHG emissions in such a way as to require a quantitative analysis.

Impact of Climate Change on Project-Related Resource Effects

Climate change may impact project-related effects by magnifying or otherwise altering impacts in other resources areas. For example, climate change may impact air quality, water resource availability, and recreation. These effects would vary from state to state depending on the resources in question and their relationship to climate change. These impacts will be considered fully in Chapter 18, Cumulative Impacts. No BMPs will be described for this aspect of the resource.

Climate change-related sea level rise is already affecting New York's coastline. Projections indicate that sea level along the New York coast and tidal Hudson River will rise by approximately 9-21 inches by the 2050s and by approximately 14-39 inches by the 2080s. Higher sea levels are already eroding beaches and inundating coastal wetlands, with negative implications for natural ecosystems, tourism, infrastructure, and coastal communities (New York State Energy Research and Development Authority (NYSERDA), 2014) (USGCRP, 2014f). Climate change is expected to increase the frequency and intensity of heavy downpours as the 21st century progresses (USGCRP, 2014g) (New York State Energy Research and Development Authority (NYSERDA), 2014). This will have consequences for both natural and built environments. For natural ecosystems, it would result in increased nutrient and sediment inputs to already stressed receiving waters, and negative impacts on both aquatic flora and fauna (USGCRP, 2014f). Average summer temperatures, the number of heating degree days, and the intensity and duration of summer heat waves in New York are all increasing, with negative consequences for public health, air quality, and certain infectious diseases, particularly in the heavily urbanized and population-dense New York City metropolitan area (NYSERDA, 2011a) (USGCRP, 2014g).

Impact of Climate Change on FirstNet Installations and Infrastructure

Climate change impacts on FirstNet installations and infrastructure will vary from state to state, depending on the placement and vulnerability of the installations and infrastructure, and the impacts that climate change is anticipated to have in that particular location.

The coastal areas of New York are at risk for stronger hurricanes as a result of climate change. Sea level rise would increase the height, areal extent, and persistence of coastal flooding during these events (USGCRP, 2014h). Stronger storms may also increase the potential for damage from high winds and wind-borne debris. For inland areas of New York at risk of flooding, climate change is projected to increase the frequency and severity of torrential downpours which in turn may increase the potential for flash floods and possibly landslides (USGCRP, 2014h).

The anticipated impact of climate change on extreme weather events such as hurricanes or heat waves may increase the severity of the emergencies to which first responders are responding in vulnerable areas, and thus the extent and duration of their dependence on FirstNet resources. In addition, extended periods of extreme heat combined with increased demand for electricity for air conditioning in the summer months may impede the operation of the electricity grid, particularly in the congested areas around New York City (NYSERDA, 2011b) (DOE, 2015), and also potentially overwhelm the capacity of onsite equipment needed to keep microwave and other transmitters cool.

11.2.14.5 Potential Impacts of the Preferred Alternative

Greenhouse Gas Emissions

The following section assesses potential GHG emission impacts associated with implementation of the Preferred Alternative in New York, including deployment and operation activities.

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment and operation of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to GHG emissions, climate impacts in other resource areas, and FirstNet infrastructure and operations, and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action, the following are likely to have no impacts to climate change under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: There would be no short-term emissions associated with construction, as construction would not take place. The equipment required to blow or pull fiber through existing conduit would be used temporarily and infrequently, resulting in no perceptible generation of GHG emissions.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up dark fiber would require no construction and have no short- or long-term emissions. This would create no perceptible change in GHG emissions.
- Satellites and Other Technologies
  - Satellite Enabled Devices and Equipment: The installation of satellite-enabled equipment on existing structures, or the use of portable satellite-enabled devices would not create any perceptible changes in GHG emissions because they would not create any new emissions sources.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. Therefore, it is anticipated that there would be no GHG emissions or any climate change effects on the project because of these activities.

Potential to Have Impacts

The deployment and use of energy-consuming equipment as a result of the implementation of the Preferred Alternative would result in GHG emissions whose significance would vary depending on their power requirements, duration and intensity of use, and number. The types of infrastructure deployment scenarios that could be part of the Preferred Alternative and result in potential impacts to GHG emissions and climate change include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: This activity would include plowing (including vibratory plowing), trenching, and directional boring, and could involve construction of POPs, huts, or other facilities to house outside plant equipment or hand holes to access fiber. These activities could generate GHG emissions.
  - New Build – Aerial Fiber Optic Plant: These projects would require construction equipment for installing or replacing new poles and hanging cables as well as excavation and grading for new or modified right-of-ways or easements. It could also include construction of POPs, huts, or other facilities to house outside plant equipment. These activities could generate GHG emissions.
  - Collocation on Existing Aerial Fiber Optic Plant: These projects would require equipment for replacement of existing wiring and poles. GHG emissions associated with these projects would arise from use of machinery and vehicles to complete these activities.
  - New Build – Submarine Fiber Optic Plant: The deployment of small work boats with engines similar to recreational vehicle engines may be required to transport and lay small wired cable. The emissions from these small marine sources would contribute to GHGs.
  - Installation of Optical Transmission or Centralized Transmission Equipment: The construction of small boxes or huts or other structures would require construction equipment, which could generate GHG emissions.
- Wireless Projects
  - New Wireless Tower Construction: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in short-term, temporary GHG emissions from vehicles and construction equipment. Long-term, permanent or temporary increases in GHG emissions would result from the electricity requirements of the towers (both grid-provided and back up), and would depend on their size, number, and the frequency and duration of their use.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on existing towers. There would be no short-term GHG emissions associated with construction, as construction would not take place. Minor, short-term, temporary GHG emissions may result from any associated equipment used for installation, such as cranes or other equipment. Long-term, permanent or temporary increases in GHG emissions would result from the electricity requirements of the towers (both grid-provided and back up), and would depend on their size, number, and the frequency and duration of their use.

- Deployable Technologies
  - COWs, COLTs, or SOWs: The long-term operations of these mobile systems have the potential to have GHG emission impacts in excess of 25,000 MT if operated in large numbers over the long-term. However, this would be highly dependent on their size, number, and the frequency and duration of their use. Emissions associated with the deployment and maintenance of a complete network solution of this type may be significant if large numbers of piloted or unmanned aircraft were used for a sustained period of time (i.e. months to years). Emissions would depend on the type of platforms used, their energy consumption, and the duration of the network's operation.

Potential climate change impacts associated with deployment activities as a result of implementation of the Preferred Alternative include increased GHG emissions. GHG emissions would arise from the combustion of fuel used by equipment during construction and changes in land use. Emissions occurring as a result of soil disturbance and loss of vegetation are expected to be less than significant due to the limited and localized nature of deployment activities. Chapter 17 discusses BMPs and mitigation measures that could be implemented, as appropriate, to further avoid or minimize potential impacts.

Climate Change Impacts on FirstNet Infrastructure or Operations

Climate change effects on the Preferred Alternative could be potentially significant to less than significant with BMPs and mitigation measures incorporated because climate change may potentially impact FirstNet installations or infrastructure during periods of extreme heat, severe storms, and other weather events. The coastal areas of New York are at risk for stronger hurricanes as a result of climate change. Sea level rise would increase the height, areal extent, and persistence of coastal flooding during these events (USGCRP, 2014h). Stronger storms may also increase the potential for damage from high winds and wind-borne debris. For inland areas of New York at risk of flooding, climate change is projected to increase the frequency and severity of torrential downpours which in turn may increase the potential for flash floods and possibly landslides (USGCRP, 2014h). Mitigation measures could minimize or reduce the severity or magnitude of a potential impact resulting to the project, including adaptation, which refers to anticipating adverse effects of climate change and taking appropriate action to prevent and minimize the damage climate change effects could cause.

Climate change's anticipated impact on extreme weather events such as hurricanes or heat waves may increase the severity of the emergencies to which first responders are responding in vulnerable areas, and thus the extent and duration of their dependence on FirstNet resources. FirstNet would likely prepare to sustain these operations in areas experiencing climate and weather extremes through the design and planning process for individual locations and operations.

11.2.14.6 Alternatives Impact Assessment

The following section assesses potential impacts to climate associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration.

Deployment Impacts

As explained above, implementation of deployable technologies could involve use of fossil-fuel-powered vehicles, powered generators, and/or aerial platforms. There could be some emissions and soil and vegetation loss as a result of excavation and grading for staging and/or landing areas depending on the type of technology. GHG emissions are expected to be less than significant based on the defined significance criteria, since activities would be temporary and short-term.

Operations Impacts

Implementing land-based deployable technologies (COW, COLT, and SOW) could result in emissions from mobile equipment on heavy trucks using internal combustion engines associated with the vehicles and onboard generators. While a single deployable vehicle may have an insignificant impact, multiple vehicles operating for longer periods, in close proximity, may have a cumulative impact, although this impact is expected to be less than significant. Some staging or landing areas (depending on the type of technology) may require excavation, site preparation, and paving. Heavy equipment used for these activities could produce emissions as a result of burning fossil fuels in internal combustion engines. The deployment and operation of aerial technology is anticipated to generate pollutants during all phases of flight, except for balloons. These activities are expected to be less than significant due the limited duration of deployment activities.

Additionally, routine maintenance and inspections of the deployable technologies are anticipated to be less than significant, given that these activities are of low-intensity and short duration.

Climate Change Impacts on FirstNet Deployable Infrastructure or Operations

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be few GHG emissions associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Emissions would arise from use of power generators as the main power source. Emissions from the use of one fossil-fuel-powered generator would not be significant based on the defined significance criteria, since activities would be temporary and short-term. These potential impacts could be further reduced through implementation of the required BMPs and mitigation measures. These projects may also consist of deploying aerial vehicles including, but not limited to, drones, balloons, blimps, and piloted aircraft, which could involve fossil fuel combustion. Climate change effects have the most noticeable impacts over a long period of time. Climate change effects such as temperature, precipitation changes, and extreme weather during operations would be expected but could have little to no impact on the deployed technology due to the temporary nature of development. However, if these technologies are deployed continuously (at the required location) for an extended period, climate change effects on deployables could be similar to the Proposed Action, as explained above.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure, or satellites and other technologies. As a result, there would be no impacts to GHG emissions or climate as a result of deployment and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.14, Climate Change.

11.2.15 Human Health and Safety

11.2.15.1 Introduction

This section describes potential impacts to human health and safety in New York associated with deployment of the Proposed Action and Alternatives. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.15.2 Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on human health and safety were evaluated using the significance criteria presented in Table 11.2.15-1. As described in Section 11.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to human health and safety addressed in this section are presented as a range of possible impacts.

11.2.15.3 Description of Environmental Concerns

Worksite Physical Hazards, Hazardous Materials, and Hazardous Waste

The human health and safety concern having the greatest likelihood to occur during FirstNet deployment activities is occupational injury to telecommunication workers. The nature of telecommunication work requires workers to execute job responsibilities that are inherently dangerous. Telecommunication work activities present physical and chemical hazards to workers. The physical hazards have the potential to cause acute injury, long-term disabilities, or in the most extreme incidents, death. Other occupational activities such as handling hazardous materials and hazardous waste often do not result in acute injuries, but may compound over multiple exposures, resulting in increased morbidity. Based on the impact significance criteria presented in Table 11.2.15-1, occupational injury impacts could be potentially significant if the FirstNet deployment locations require performing occupational activities that have the highest relative potential for physical injury and/or chemical exposure. Examples of activities that may present increased risk and higher potential for injury include working from heights (i.e., from towers and roof tops), ground-disturbing activities and excavating, confined space entry, operating heavy equipment, and the direct handling of hazardous materials and hazardous waste. Predominately, these hazards are limited to occupational workers, but may impact the general public if there are trespassers or if any physical of chemical hazard extends beyond the restricted access of proposed FirstNet work sites. For example, if fuel is spilled from an onsite fuel tank, the spilled fuel could migrate down gradient and infiltrate underground drinking water sources. The general public may then be exposed to hazardous chemicals in their drinking water if they utilize the same groundwater aquifer.

Table 11.2.15-1: Impact Significance Rating Criteria for Human Health and Safety

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
Exposure to Worksite Occupational Hazards as a Result of Activities at Existing or New FirstNet Sites	Magnitude or Intensity	Exposure to concentrations of chemicals above occupational regulatory limits and time weighted averages (TWAs). A net increase in the amount of hazardous or toxic materials or wastes generated, handled, stored, used, or disposed of, resulting in unacceptable risk, exceedance of available waste disposal capacity and probable regulatory violations. Exposure to recognized workplace safety hazards (physical and chemical). Violations of various regulations including: OSHA, RCRA, CERCLA, TSCA, EPCRA	Effect is potentially significant, but with mitigation is less than significant.	No exposure to chemicals above health-protective screening levels. Hazardous or toxic materials or wastes could be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. No exposure to unsafe working conditions or other workplace safety hazards.	No exposure to chemicals, unsafe working conditions, or other workplace safety hazards.
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state/territory)		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Occasional frequency during the life of the project.		Rare event	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than Significant with BMPs and Mitigation Measures Incorporated	Less than Significant	No Impact
Exposure to Hazardous Materials, Hazardous Waste, and Mine Lands as a Result of FirstNet Site Selection and Site-Specific Land Disturbance Activities	Magnitude or Intensity	Exposure to concentrations of chemicals above regulatory limits, or USEPA chemical screening levels protective of the general public. A net increase in the amount of hazardous or toxic materials or wastes generated, handled, stored, used, or disposed of, resulting in unacceptable risk, exceedance of available waste disposal capacity and probable regulatory violations. Site contamination conditions could preclude development of sites for the proposed use. Violations of various regulations including OSHA, RCRA, CERCLA, TSCA, EPCRA. Unstable ground and seismic shifting.	Effect is potentially significant, but with mitigation is less than significant.	No exposure to chemicals above health-protective screening levels. Hazardous or toxic materials or wastes could be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. No exposure to unstable ground conditions or other workplace safety hazards.	No exposure to chemicals, unstable ground conditions, or other workplace safety hazards.
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state/territory)		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Occasional frequency during the life of the project.		Rare event	NA
Exposure to Hazardous Materials, Hazardous Waste, and Occupational Hazards as a Result of Natural And Man-Made Disasters	Magnitude or Intensity	Exposure to concentrations of chemicals above regulatory limits, or USEPA chemical screening levels protective of the general public. Site contamination conditions could preclude development of sites for the proposed use. Physical and biologic hazards. Loss of medical, travel, and utility infrastructure.	Effect is potentially significant, but with mitigation is less than significant.	No exposure to chemicals above health-protective screening levels. Hazardous or toxic materials or wastes could be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. No exposure to unsafe	No exposure to chemicals, unsafe conditions, or other safety and exposure hazards.

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than Significant with BMPs and Mitigation Measures Incorporated**	**Less than Significant**	**No Impact**
				conditions. No loss of medical, travel, or utility infrastructure.	
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state/territory)		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Occasional frequency during the life of the project.		Rare event	NA

NA = not applicable

To protect occupational workers, OSHA mandates that employers be required to protect their employees from occupational hazards that could result in injury. Depending on the source of the hazard and the site-specific work conditions, OSHA generally recommends the following hierarchy for protecting onsite workers (OSHA, 2015b).

1.) Engineering controls;
2.) Work practice controls;
3.) Administrative controls; and then
4.) Personal protective equipment (PPE).

Engineering controls are often physical barriers that prevent access to a worksite, areas of a worksite, or from idle and operating equipment. Physical barriers take many forms like perimeter fences, trench boxes, chain locks, bollards, storage containers (for storing equipment and chemicals), or signage and caution tape. Other forms of engineering controls could include machinery designed to manipulate the quality of the work environment, such as ventilation blowers. Whenever practical, engineering controls may result in the complete removal of the hazard from the work site, an example of which would be the transport and offsite disposal of hazardous waste or asbestos containing materials.

Work practice controls could be implemented as abiding by specific OSHA industry standards, such as the Confined Space Entry standard (29 CFR 1910.146) or thru the development of employer specific workplace rules and operational practices (OSHA, 2015b). To the extent practicable, FirstNet partner(s) would likely implement and abide by work practice controls through employee safety training and by developing site-specific health and safety plans (HASP). The HASPs would identify all potential hazardous materials and hazardous wastes, potential physical hazards, and applicable mitigation steps. Other components of a HASP identifying appropriate PPE for each task and the location of nearby medical facilities. Safety Data Sheets (SDS) describing the physical and chemical properties of hazardous materials used during FirstNet deployment and maintenance activities, as well as the physical and health hazards, routes of exposure, and precautions for safe handling and use would be kept and maintained at all FirstNet project sites. In addition to HASPs and SDSs, SOPs would be developed and implemented by FirstNet partner(s) for critical and/or repetitive tasks that require attention to detail, specialized knowledge, or clear step-wise directions to prevent worker injury and to ensure proper execution.

Administrative controls are employer-initiated methods to reduce the potential for injury and physical fatigue (OSHA, 2015b). Administrative controls may take the form of limiting the number of hours an employee is allowed to work per day, requiring daily safety meetings before starting work, utilizing the buddy system for dangerous tasks, and any other similar activity or process that is designed to identify and mitigate unnecessary exposure to hazards. When engineering controls, work practice controls, and administrative controls are not feasible or do not provide sufficient protection, employers must also provide appropriate PPE to their employees and ensure its proper use. PPE is the common term used to refer to the equipment worn by employees to minimize exposure to chemical and physical hazards. Examples of PPE include gloves, protective footwear, eye protection, protective hearing devices (earplugs, muffs), hard hats, fall protection, respirators, and full body suits. PPE is the last line of defense to prevent occupational injuries and exposure.

The New York State Department of Labor, Division of Safety and Health (NYDOSH) is authorized by OSHA to administer the state program which oversees employee safety in all state and local government workplaces. The FirstNet proposed action and site work will not be performed by state or local employees. The involvement of state and local employees will be limited to emergency responders (e.g., police, fire, emergency medical transporters, etc.) and local government permitting authorities.

Hazardous Materials, Hazardous Waste, and Mine Lands

The presence of environmental contamination at FirstNet deployment sites has the potential to negatively impact health and safety of workers and the general public. Past or present contaminated media, such as soil and groundwater, may be present and become disturbed as a result of site activities. Based on the impact significance criteria presented in Table 11.2.15-1, human health impacts could be significant if FirstNet deployment sites are near contaminated properties. Prior to the start of any FirstNet deployment project, potential site locations should be screened for known environmental contamination and/or mining activities using federal resources such as the USEPA Cleanups in My Community database and U.S. Department of Interior's (USDOI's) Abandoned Mine Lands inventory, through NYSDEC, or through an equivalent commercial resource, such as Environmental Data Resources, Incorporated.

By screening sites for environmental contamination and reported environmental liabilities, the presence of historic contamination and unsafe ground conditions could be evaluated and may influence the site selection process. In general, the lower the density of environmental contamination, the more favorable the site will be for FirstNet deployment projects. If sites containing known environmental contamination are selected for proposed FirstNet deployment activities it may be necessary to implement additional controls (e.g., engineering, work practice, administrative, and/or PPE) to ensure workers, and the general public, are not unnecessarily exposed to the associated hazards. Additionally, for any proposed FirstNet deployment site, it is possible undocumented environmental contamination is present.

During FirstNet deployment activities, if any soil or groundwater is observed to be stained or emitting an unnatural odor, it may be an indication of environmental contamination. When such instances are encountered, it may be necessary to stop work until the anomaly is further assessed through record reviews or environmental sampling. Proposed FirstNet deployment would attempt to avoid known contaminated sites. However, in the event that FirstNet is unable to avoid a contaminated site, then site analysis and remediation would be required under RCRA, CERCLA, Superfund, and applicable New York state laws in order to protect workers and the general public from direct exposure or fugitive contamination.

Exposure assessments identify relevant site characteristics, temporal exposure parameters, and toxicity data to determine the likelihood of adverse health effects. More formally known as a human health risk assessment (HHRA), these studies provide mathematical justification for implementing controls at the site to protect human health. If the HHRA determines the potential for adverse health effects is too great NYSDEC may require FirstNet to perform environmental clean-up actions at the site to lower the existing levels of contamination. HHRAs help determine which level of PPE (i.e., Level D, Level C, Level B, or Level A) is necessary for a work activity. HHRAs take into account all exposure pathways: absorption, ingestion, inhalation, and injection. Therefore, specific protective measures (e.g., controls and PPE) that disrupt the exposure pathways could be identified, prioritized, and implemented.

Natural and Manmade Disasters

FirstNet is intended to improve connectivity among public safety entities during disasters, thereby improving their ability to respond more safely and effectively during such events. The addition of towers, structures, facilities, equipment, and other deployment activities is expected to allow for expedited responses during natural and manmade disasters. The impacts of natural and manmade disasters are likely to present unique health and safety hazards, as well as exacerbate pre-existing hazards, such as degrading occupational work conditions and disturbing existing environmental contamination. The unique hazards presented by natural and manmade disasters may include, fire, weather incidents (e.g., floods, tornadoes, hurricanes, etc.), earthquakes, vandalism, large- or small-scale chemical releases, utility disruption, community evacuations, or any other event that abruptly and drastically denudes the availability or quality of transportation infrastructure, utility infrastructure, medical infrastructure, and sanitation infrastructure. Additionally, such natural and manmade disasters could directly impact public safety communication infrastructure assets through damage or destruction.

Based on the impact significance criteria presented in Table 11.2.15-1, human health impacts could be significant if FirstNet deployment sites are located in areas that are directly impacted by natural and manmade disasters that could lead to exposure to hazardous wastes, hazardous materials, and occupational hazards. FirstNet's emphasis on public safety-grade communications infrastructure may result in a less than significant beneficial impact, as new infrastructure could be deployed with additional structural hardening, and existing infrastructure may also be hardened as appropriate and feasible, in an effort to reduce the possibility of infrastructure damage or destruction to some degree.

Potential mitigation measures for natural disasters is to be aware of current weather forecasts, forest fire activities, seismic activities, and other news worthy events that may indicate upcoming disaster conditions. Awareness provides time and opportunity to plan evacuation routes, to relocate critical equipment and parts, and to schedule appropriate work activities preceding and after the natural disaster. These mitigation steps reduce the presence of workers and dangerous work activities to reduce the potential for injury or death. Manmade disasters could be more difficult to anticipate due to the unexpected or accidental nature of the disaster. Though some manmade disasters are due to malicious intentions, many manmade disasters result from human error or equipment failure. The incidence of manmade disasters affecting FirstNet deployment sites would be difficult to predict and diminish because the source of such disasters is most likely to originate from sources independent of FirstNet activities. Therefore, FirstNet partner(s) would develop disaster response plans that outline specific steps employees should take in the event of a natural or manmade disaster.

11.2.15.4 Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and maintenance activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to human health and safety and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant with mitigation, depending on the deployment scenario or site-specific activities.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to human health and safety under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: the pulling or blowing of fiber optic cable would be performed through existing conduit. Use of mechanical equipment would be limited to pulley systems and blowers. Some locations with no existing power supply may require the use of electrical generators although these materials are expected to be used infrequently and in small quantities. These activities are not likely to result in serious injury or chemical exposure, or surface disturbances since work would be limited to existing entry and exit points, would be temporary, and intermittent. It is anticipated that there would be no impacts to human health and safety.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber could have no impacts to human health and safety because there would be no ground disturbance or heavy equipment used.
- Satellites and Other Technologies
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact human health and safety resources, it is anticipated that this activity would have no impact on those resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to human health and safety as a result of implementation of the Preferred Alternative would encompass a range of impacts that occur as a result of ground disturbance activities, construction activities, equipment upgrade activities, management of hazardous materials and/or hazardous waste, and site selection. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to human health and safety include the following:

- Wired Projects
    - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber would require the use of heavy equipment and hazardous materials. The additional noise and activity at the site would require workers to demonstrate a high level of situational awareness. Failure to follow OSHA and industry controls could result in injuries. Excavation of soil at proposed sites known to contain environmental contamination has the potential to expose workers to harmful chemicals or releases that could impact the general public in the immediate vicinity. Additionally, some of this work would likely be performed along road ROWs, increasing the potential for vehicle traffic to collide with site workers or equipment. If a proposed deployment activity involves the operation of heavy equipment, managing hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.
    - New Build – Aerial Fiber Optic Plant: Installation of new poles and fiber optic lines could require excavation activities, working from heights, use of hazardous materials, and site locations in ROWs. Hazards associated with the site work include injury from heavy equipment, fall hazards, chemical hazards, and the potential for vehicle traffic to collide with site workers or equipment. Excavation of soil at proposed sites known to contain environmental contamination has the potential to expose workers to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.
    - Collocation on Existing Aerial Fiber Optic Plant: Installation of overhead fiber optic lines would require work from height. In some instances, new poles would be installed requiring excavation activities with heavy equipment. Hazards associated with the site work include injury from heavy equipment, fall hazards, chemical hazards, and the potential for vehicle traffic to collide with site workers or equipment. Excavation of soil at proposed sites known to contain environmental contamination has the potential to expose workers to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of

heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.

- New Build – Submarine Fiber Optic Plant: The installation of fiber optic cables in bodies of water requires workers to operate over aquatic and/or marine environments, which presents opportunities for drowning. When working over water exposure to sun, high or low temperatures, wind, and moisture could impact worker safety. Construction of landings and/or facilities on shore to accept submarine cable would require site preparation, construction, and management of hazardous materials and hazardous waste. Excavation of soils or sediments at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves working over water, weather exposure, the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.

- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment would require site preparation, construction activities, and management of hazardous materials and hazardous waste. Excavation of soils at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads would require site preparation, construction activities, and management of hazardous materials and hazardous waste. Communication towers would be erected, requiring workers to perform their duties from heights sufficient to result in serious injury or death in the event of falling. Working from heights may also result in additional overhead hazards and falling objects. Excavation of soils at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower. This would require workers to perform their duties from heights sufficient to result in serious injury or death in the event of falling not result in impacts to soils. Working from heights may also result in additional overhead hazards and falling objects. Excavation of soils at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

- Deployable Technologies
  - The use of deployable technologies could result in soil disturbance if land-based deployables are deployed on unpaved areas or if the implementation results in paving of previously unpaved surfaces. The use of heavy machinery presents the possibility for spills and soil and water contamination, and noise emissions could potentially impact human health; and vehicles and heavy equipment present the risk of workplace and road traffic accidents that could result in injury. Set-up of a cellular base station contained in a trailer with a large expandable antenna mast is not expected to result in impacts to human health and safety. However, due to the larger size of the deployable technology, site preparation or trailer stabilization may be required to ensure the self-contained unit is situated safely at the site. Additionally, the presence of a dedicated electrical generator would produce fumes and noise. The possibility of site work and the operation of a dedicated electrical generator have the potential for impacts to human health and safety. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Use of aerial vehicles would not involve telecommunication site work. Prior to deployment and when not in use, the aerial vehicles would likely require preventive maintenance. Workers responsible for these activities may handle hazardous materials, not limited to fuel, solvents, and adhesives.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: The use of portable devices that utilize satellite technology would not impact human health and safety because there is no construction activities or use of hazardous materials. The installation of permanent equipment on existing structures may require workers to operate from heights or in sensitive environments. As a result, the potential for falling, overhead hazards, and falling objects is greater and there is a potential to impact human health and safety.

In general, the abovementioned FirstNet activities could potentially involve site preparation work, construction activities, work in potentially harmful environments (road ROWs, work over water, and environmental contamination), management of hazardous materials and hazardous waste, and weather exposure. Potential impacts to human health and safety associated with deployment of the Proposed Project include injury from site preparation and operating heavy equipment, construction activities, falling/overhead hazards/falling objects, exposure and release of hazardous chemicals and hazardous waste. It is anticipated that potential health impacts associated with human exposure to environmental hazardous materials in air, water, or soil, the risk of road traffic, workplace accidents and injuries, noise exposure, and risk of infectious disease transmission would be less than significant due to the small-scale of likely FirstNet activities that would be temporary and of short duration. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there would be less than significant impacts to human health and safety associated with routine inspections of the Preferred Alternative, assuming that the inspections do not require climbing towers or confined space entry. In those instances, PPE or other mitigation measures could would be necessary to adequately protect workers. If usage of heavy equipment is part of routine maintenance, the potential for impacts to human health and safety would also increase. It is anticipated that potential health impacts associated with human exposure to environmental hazardous materials in air, water, or soil, the risk of road traffic, workplace accidents and injuries, noise exposure, and risk of infectious disease transmission would be less than significant due to the small-scale of likely FirstNet activities that would be temporary and of short duration. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

11.2.15.5 Alternatives Impact Assessment

The following section assesses potential impacts to human health and safety associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable land-based infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration.

Therefore, potential impacts to human health and safety as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to human health and safety. The largest of the land-based deployable technologies may require site preparation work or stabilization work to ensure the self-contained trailers are stable. Heavy equipment may be necessary to complete the site preparation work. However, in general, the deployable technologies are small mobile units that could be transported as needed. While in operation, the units are parked and operate off electrical generators or existing electrical power sources. Connecting deployable technology to a power supply may present increased electrocution risk during the process of connecting power. If the power source is an electrical generator, then there would also likely be a need to manage hazardous materials (fuel) onsite. These activities could result in less than significant impacts to human health and safety. It is anticipated that potential health impacts associated with human exposure to environmental hazardous materials in air, water, or soil, the risk of road traffic, workplace accidents and injuries, noise exposure, and risk of infectious disease transmission would be less than significant due to the small-scale of likely FirstNet activities that would be temporary and of short duration. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to human health and safety associated with routine inspections of the Preferred Alternative, assuming that the inspections do not require climbing towers or confined space entry. In those instances, PPE or other mitigation measures may be necessary to adequately protect workers. If usage of heavy equipment is part of routine maintenance, the potential for impacts to human health and safety would also increase. These impacts would be less than significant because of the small-scale of likely FirstNet activities; activities associated would routine maintenance, inspection, and deployment of deployable technologies would be temporary and often of limited duration. See Chapter 17, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to human health and safety as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 11.1.15, Human Health and Safety.

NY APPENDIX A – WATER RESOURCES

Table A-1: Characteristics of New York's Watersheds, as Defined by NYSDEC

Watershed/Size Land Area within NY (square miles)	Major Surface Waterbodies	Major Water Quality Concerns
St. Lawrence River (5,600)	Oswegatchie River Raquette River Saint Regis River Grass River Indian River Black Lake Cranberry Lake Raquette Lake Tupper Lake Long Lake	• Acid rain • Atmospheric deposition of mercury • Agricultural activities • Hazardous waste and legacy industrial impacts in the Massena Area of Concern
Lake Champlain (3,050)	Ausable River Saranac River Great Chazy River Boquet River Mettawee River Ticonderoga Creek Lake George Upper Saranac Lake Lower Saranac Lake Lake Placid Lake Champlain	• Acid rain • Atmospheric deposition of mercury • Agricultural and other nonpoint sources
Black River (1,920)	Moose River Beaver River Independence River Deer River Stillwater Reservoir Fulton Chain of Lakes Lake Lila Big Moose Lake Woodhull Lake	• Acid rain • Atmospheric deposition of mercury • Agricultural and other nonpoint sources • On-site septic and rural community wastewater treatment
Upper Hudson River (4,620)	Sacandaga River Schroon River Fish Creek Hoosic River Batten Kill Great Sacandaga Lake Indian Lake Schroon Lake Saratoga Lake	• Acid rain, • Atmospheric deposition of mercury, and • Legacy industrial PCB discharges
Lake Ontario and Minor Tributaries (2,460)	Salmon River Oak Orchard River Irondequoit River Sandy Creek Salmon River Reservoir Sodus Bay North Pond Irondequoit Bay Perch Lake	• Invasive and other aquatic plant growth • Legacy industrial discharges in Areas of Concern

Watershed/Size Land Area within NY (square miles)	Major Surface Waterbodies	Major Water Quality Concerns
Niagara River/Lake Erie (2,280)	Tonawanda Creek Cattaraugus Creek Buffalo River Attica Reservoir Lime Lake	• Legacy industrial discharges in Buffalo-Niagara Falls area, • Urban stormwater and combined sewer overflows, and • Agricultural and other nonpoint sources
Genesee River (2,373)	Cassadaga Creek Honeoye Creek Oatka Creek Black Creek Conesus Lake Mount Morris Reservoir Hemlock Lake Honeoye Lake	• Urban stormwater and industrial runoff, and • Agricultural and other nonpoint sources
Allegheny River (1,920)	Conewango Creek Cassadaga Creek Olean Creek Great Valley Creek French Creek Allegheny Reservoir Chautauqua Lake	• Agricultural and other nonpoint sources, • Invasive aquatic species, and • Urban stormwater and industrial runoff
Chemung River (1,740)	Cohocton River Tioga/Canisteo Rivers Lamoka Lake/Mill Pond Waneta Lake Almond Lake	• Agricultural and other nonpoint sources • Flooding impacts in the flood-prone Southern Tier of New York
Oswego River/Finger Lakes (5,070)	Oneida River Clyde River Cayuga Lake Tributaries Seneca Lake Tributaries Oneida Lake Cayuga Lake Seneca Lake Keuka Lake Canandaigua Lake	• Legacy industrial discharges in Syracuse/Onondaga Lake area, • Municipal wastewater and combined sewer overflows in Syracuse and other urban areas, and • Agricultural and other nonpoint sources
Mohawk River (3,460)	Schoharie Creek West Canada Creek East Canada Creek Hinkley Reservoir Delta Reservoir Peck Lake Schoharie Reservoir	• Municipal wastewater and combined sewer overflows in Utica and other urban areas • Urban runoff and industrial impacts • Agricultural and other nonpoint sources • Acid rain • On-site septic and rural community wastewater discharges
Susquehanna River (4,520)	Chenango River Tioughnioga River Unadilla River Owego Creek Otsego Lake Canadarago Lake Whitney Point Lake/Reservoir	• Agricultural and other nonpoint sources, • Municipal wastewater and combined sewer overflows in Binghamton-Johnson City area, • On-site septic and rural community wastewater discharges, and • Flooding impacts in the flood-prone Southern Tier of New York
Delaware River (2,390)	East Branch Delaware River West Branch Delaware River	• Acid rain and atmospheric deposition of mercury

Watershed/Size Land Area within NY (square miles)	Major Surface Waterbodies	Major Water Quality Concerns
	Neversink River Monguap River Pepacton Reservoir Cannonsville Reservoir Neversink Reservoir	
Lower Hudson River (4,982)	Rondout/Wallkill Rivers Stockport/Kinderhook Creeks Catskill Creek Esopus Creek Croton River Ashokan Reservoir Rondout Reservoir New Cronton Reservoir Alcove Reservoir Cross River Reservoir Muscoot/Upper New Croton Reservoir	• Municipal wastewater and combined sewer overflow impacts in New York City and other urban areas, urban/stormwater runoff and industrial impacts, • Agricultural and other nonpoint sources, and • Legacy industrial PCB discharges to Upper Hudson
Housatonic River (220)	Tenmile River Green River Indian Lake Swift/Crane Pond	NA
Ramapo River (211)	Ramapo River Hackensack River Greenwood Lake DeForest Lake	• Urban/stormwater runoff • Municipal and residential wastewater discharges
Atlantic Ocean/Long Island Sound (1,650)	Bronx River Mamaroneck River Mianus River Peconic River Kensico Reservoir Lake Ronkonkoma	• Long Island Sound hypoxia impacts • Municipal wastewater and combined sewer overflow impacts in New York City and other urban areas, • Urban/stormwater runoff and industrial impacts, and • Legacy industrial toxics discharges

Source: (NYSDEC, 2015cg), (NYSDEC, 2015ch), (NYSDEC, 2015ci), (NYSDEC, 2015cj), (NYSDEC, 2015ck), (NYSDEC, 2015cl), (NYSDEC, 2015cm), (NYSDEC, 2015cn), (NYSDEC, 2015co), (NYSDEC, 2015cp), (NYSDEC, 2015cq), (NYSDEC, 2015cr), (NYSDEC, 2015cs), (NYSDEC, 2015ct), (NYSDEC, 2015cu), (NYSDEC, 2015cv), (NYSDEC, 2015bu)

Table A-2: New York Wild, Scenic, and Recreational Rivers

River Name	River Segment Description
Rivers or Segments Designated as Wild	
Cedar River	(a) Approximately 7 miles from the southwest boundary of lot 82, Township 17, Totten and Crossfield's Purchase to the Hamilton County line; and
	(b) Approximately 7.3 miles from the outlet of Cedar Lakes to a point where a road crosses the river approximately 1.5 miles upstream of Cedar River flow.
Cold River	Approximately 14 miles from the Duck Hole to the confluence with the Raquette River and the entire three-mile length of Ouluska Pass Brook.
Hudson River	Approximately 10.5 miles from the confluence of the Cedar River to the confluence with the Boreas River.
Indian River	Approximately 13 miles from Brook Trout lake to the confluence with the South Branch of the Moose River.
Kunjamuk River	Approximately 8 miles from the outlet of South Pond to a fish barrier dam near the southwest boundary of Lot 9, Township 31, Gorton Tract.
Opalescent River	Approximately 11 miles from Flowed Lands to the confluence with the Hudson River.
Oswegatchie River, Main Branch	Approximately 18.5 miles from the Partlow Mill Dam to the southernmost boundary between private and state land at Inlet.
Oswegatchie River, Middle Branch	Approximately 14.5 miles from the north boundary of Lot 27, Watson's East Triangle to a point one mile downstream of the confluence with Wolf Creek.
Piseco Outlet	Approximately 4.2 miles from a point 0.5 mile east of the Route 10 bridge crossing to the confluence with the West Branch of the Sacandaga River.
Sacandaga River, East Branch	Approximately 11.5 miles from Botheration Pond to a point 0.5 mile above the confluence with Cook Brook.
Sacandaga River, West Branch	(a) Approximately 7 miles from the confluence of the Piseco Lake outlet to the confluence with Dugway Creek;
	(b) Approximately 9 miles from the source near Silver Lake Mountain to the Silver Lake wilderness boundary near Route 10; and
	(c) Approximately 2.7 miles from the confluence with Cow Creek to the confluence with Piseco outlet.
West Canada Creek	Approximately 8 miles from Mud Lake to the Old Mitchell dam site.
West Canada Creek, South Branch	Approximately 5.9 miles from the headwaters near T-Lake Falls to a footbridge crossing located approximately one mile upstream of the Floe.
Rivers or Segments Designated as Scenic	
Ampersand Brook	Approximately 8 miles from Ampersand Pond to the confluence with the Raquette River.
Ausable River	Approximately 9 miles from Marcy swamp to St. Hubert's.
Black River	Approximately 7.8 miles from the point where Farr Road crosses the river to the point where the river intersects the Adirondack Park boundary.
Blue Mountain Stream	Approximately 9 miles from the outlet of Clear Pond to the confluence with Pleasant Lake stream.
Bog River	Approximately 7.3 miles from the dam below Hitchens Pond to Big Tupper Lake.
Boreas River	Approximately 11.5 miles from Cheney Pond to the confluence with the Hudson River.
Bouquet River	(a) Approximately 6 miles of the North Fork from the headwaters on Dial Mountain to the bridge on Route 73; and
	(b) Approximately 5.5 miles of the South Fork from the headwaters to the bridge on Route 73.
Carmens River	(a) Approximately 2.25 miles from its headwaters at the north boundary of Cathedral Pines Park (formerly Camp Wilderness), Suffolk County, southerly to its intersection with the southern boundary of Camp Sobaco (Girl Scout Camp);
	(b) Approximately 2.5 miles from Yaphank Avenue, Suffolk County, southerly to the Concrete Wing Dam in Southhaven Park; and

River Name	River Segment Description
Rivers or Segments Designated as Wild	
	(c) Approximately 2.5 miles from the south side of Sunrise Highway, Suffolk County, southerly to the mouth of the river (a line between Long Point and Sandy Point) at its confluence with Great South Bay.
Cedar River	(a) Approximately 5 miles from the Hamilton County line to the confluence with the Hudson River; and
	(b) Approximately 10 miles from a point where a road crosses the river 1.5 miles upstream of Cedar River flow to a point where a southerly extension of the northeast state land boundary of Lot 96, Township 33, Totten and Crossfield's Purchase, would intersect the river.
Deer River	Approximately 6.2 miles from the outlet of Deer River flow to a point where the river intersects the Adirondack Park boundary.
East Canada Creek	Approximately 20.90 miles from Powley Place to a point at which the creek intersects the Adirondack Park boundary near Sprite Creek at the southwest corner of Lot 45, Town of Oppenheim, Lott and Low's Patent.
Genesee River	Within Letchworth State Park.
Grasse River, Middle Branch	Approximately 14.5 miles from the confluence of Blue Mountain stream and Pleasant Lake stream to the confluence of the South Branch of the Grasse River.
Grasse River, North Branch	Approximately 25.4 miles from the outlet of Church Pond to a point where the North Branch intersects the Adirondack Park boundary.
Grasse River, South Branch	(a) Approximately 35.2 miles from the outlet of Center Pond to the confluence with the outlet of Allen Pond; and
	(b) Approximately 3.7 miles from the most southerly point where the South Branch of the Grasse River intersects the Adirondack Park boundary, north to the confluence with the Middle Branch of the Grasse River.
Hudson River	(a) Approximately 9 miles from the hamlet of Newcomb to the confluence with the Cedar River; and
	(b) Approximately 4 miles from the confluence with the Boreas River to a point 1 mile north of the hamlet of North River.
Independence River	Approximately 26 miles from the outlet of Little Independence Pond to the point where the Sperryville Bridge crosses the river.
Jordan River	Approximately 18 miles from the outlet of Marsh Pond to Carry Falls Reservoir.
Kuniamuk River	Approximately 10.4 miles from a fish barrier dam near the southwest boundary of Lot 9, Township 31, Gorton Tract, to the confluence with the Sacandaga River.
Lonq Pond Outlet	Approximately 16 miles from the outlet of Long Pond to the confluence with the West Branch of the St. Regis River.
Marion River	Approximately 5 miles from the outlet of Utowana lake to Raquatte Lake.
Moose River, Main Branch	Approximately 15.4 miles from the confluence of the South and Middle Branches of the Moose River to a point where the Main Branch intersects the Adirondack Park boundary.
Moose River, North Branch	Approximately 6 miles from the outlet of Big Moose Lake to the confluence with the outlet of Goose Pond.
Moose River, South Branch	(a) Approximately 18 miles from the east boundary of the state land immediately west of Little Moose Lake to the west boundary of the state land near Rock Dam;
	(b) Approximately 6.5 miles from the east boundary of the state land just north of Woodhull Mountain downstream to the state land boundary near the confluence with the middle branch of the Moose River; and
	(c) Approximately 14.2 miles from the west boundary of state land near Rock Dam to the east boundary of state land north of Woodhull Mountain.
Nissequoque River	Approximately 1.4 miles from the dam at the outlet of New Mill Pond to the pedestrian bridge south of Route 25/25A including its tributaries and ponds identified as P288 Phillips Millpond, P289 Willow Pond, P290 Upper Vail Pond, P291 Webster Pond, and P291a Lower Vail Pond (on a certain map titled "Official Classifications - Surface Waters of Western Suffolk County," published by the Water Resources Council and prepared by the NYSDOH in Suffolk County.

River Name	River Segment Description
Rivers or Segments Designated as Wild	
Osweqatchie River, Middle Branch	(a) Approximately 9 miles from the outlet of Walker Lake to the north boundary of Lot 27, Watson's East Triangle; and
	(b) Approximately 14.4 miles from a point one mile downstream of the confluence with Wolf Creek to a point where the Middle Branch intersects the Adirondack Park boundary at the southeast boundary of Lot 993, Township of Diana, Macomb's Purchase, Great Tract 4.
Osweqatchie River, West Branch	Approximately 7 miles from the outlet of Buck Pond to a point approximately one mile upstream of Round Pond at the point where a foot and snowmobile bridge crosses the West Branch.
Otter Brook	Approximately 10 miles from the outlet of Lost Pond to the confluence with the South Branch of the Moose River.
Peconic River	(a) Approximately 10.5 miles from the western boundary of the Red Maple swamp to the Long Island railroad bridge between Connecticut and Edwards Avenue; and
	(b) Approximately 3 miles from Middle Country Road (State Route 25) to the confluence with the previously described segment of the Peconic including tributaries T112-5, T112-6 and T112-7.
Raquette River	(a) Approximately 20 miles from the outlet of Long Lake to the confluence with a small stream from the northeast, located approximately one mile downstream from Trombley Landing; and
	(b) Approximately 13.8 miles from the confluence with Dead Creek to a point where the river intersects the north boundary of Lot 1, Township 5, Tannery Lot near Carry Falls Reservoir.
Red River	Approximately 9.7 miles from the headwaters of the river to the confluence with the South Branch of the Moose River.
Rock River	Approximately 6.9 miles from the O'Neil flow road crossing to the confluence with the Cedar River.
Round Lake Outlet	Approximately 2.7 miles from the outlet of Round Lake to the confluence with the Bog River.
St. Reqis River, East Branch	Approximately 14.5 miles from a point where Route 30 crosses the East Branch near Meacham Lake, to a point one-half mile upstream from Everton Falls.
St. Reqis River, Main Branch	Approximately 15.5 miles from a point where a private road to Bay Pond crosses the Main Branch in Lot 16, Township 17, Macomb's Purchase, Great Tract 1, to the confluence with Balsam Brook.
St. Reqis River, West Branch	Approximately 35 miles from the outlet of Little Fish Pond to a point 0.5 mile downstream from the confluence with Fenner Meadow Brook.
West Canada Creek	Approximately 17 miles from a point where the creek intersects that state land boundary approximately 2 miles upstream of the Old Mitchell Dam site, to the Route 8 bridge crossing near Nobleboro.
West Stoney Creek	Approximately 7.7 miles from the Tannery Road crossing to the confluence with Hatch Brook.
Rivers or Segments Designated as Recreational	
Ausable River, East Branch	Approximately 28.3 miles from St. Huberts to the confluence with the West Branch.
Ausable River, Main Branch	Approximately 22 miles from the confluence of the East and West Branches of the Ausable River to Lake Champlain.
Ausable River, West Branch	(a) Approximately 5 miles from the state boundary along the River Road east of Big Cherry Patch Pond downstream to the state boundary immediately west of High Falls; and
	(b) Approximately 29.5 miles from the headwaters of the West Branch near Heart Lake to the confluence with the East Branch.
Black River	Approximately 6.6 miles from the outlet of North Lake to a point where Farr Road crosses the river.
Bouquet River	Approximately 47.7 miles from the confluence with the North Fork of the Bouquet River to Lake Champlain.

River Name	River Segment Description
Rivers or Segments Designated as Wild	
Carmens River	(a) Approximately 2 miles from its intersection with the southern boundary of Camp Sobaco (Girl Scout Camp), southerly to Yaphank Avenue, Suffolk County; and
	(b) Approximately 1 mile southerly from the Concrete Wing Dam in Southhaven Park, Suffolk County, to Sunrise highway.
Cedar River	Approximately 11 miles from a point at which a southerly extension of the northeast state land boundary parallel to the southwest boundary of Lot 96, Township 33, Totten and Crossfield's Purchase would intersect the river to the southwest boundary of Lot 82, Township 17, Totten and Crossfield's Purchase.
Connetquot River	Approximately 5.75 miles from Johnson Avenue, Suffolk County, south to the Sunrise highway.
Fall Creek	Approximately 1.8 miles from the southern boundary of Cayuga Lake to the west face of the foot bridge running across Fall Creek, which foot bridge is located between Thurston Avenue on the west and Beebe Lake on the east (in the City of Ithaca, Tompkins County).
Grasse River, South Branch	Approximately 5.2 miles from the confluence with the outlet of Allen Pond to the most southerly point where the South Branch intersects the Adirondack Park boundary.
Hudson River	(a) Approximately 12.7 miles from the confluence with the Opalescent River to a point where Route 28N crosses the Hudson River at Newcomb;
	(b) Approximately 45.9 miles from a point one mile north of North River to the confluence with the Sacandaga River.
Independence River	Approximately 0.5 mile from a point where the Sperryville bridge crosses the river to a point where the river intersects the Adirondack Park boundary.
Indian River	Approximately 8.3 miles from the outlet of Indian Lake to the confluence with the Hudson River.
Moose River, Middle Branch	Approximately 13.4 miles from the confluence with the North Branch of the Moose River to the confluence with the South Branch of the Moose River.
Moose River, North Branch	Approximately 13 miles from the confluence with the outlet of Goose Pond to the confluence with the Middle Branch of the Moose River.
Nissequogue River	(a) Approximately 1.4 miles from State Route 347 to the dam at the outlet of New Mill Pond including its tributaries identified as P292-1 to Brooksite Drive and two unnamed tributaries P292-2 and P292-3; and
	(b) Approximately 5 miles from the pedestrian walkway and dam at the outlet of Phillips Millpond to its confluence with Long Island Sound including its tributaries and ponds connected therewith [specifically described as T-62 on a certain map entitled "Official Classifications - Surface Waters of Western Suffolk County," prepared by the NYSDOH and published by the Water Resources Council].
Oswegatchie River, Main Branch	Approximately 2.3 miles from the southernmost boundary between private and state land at Inlet to Wanakena.
Oswegatchie River, West Branch	Approximately 6.1 miles from a point approximately one mile upstream of Round Pond at the point where a foot and snowmobile bridge crosses the West Branch to a point where the river intersects the Adirondack Park boundary.
Peconic River	(a) Approximately 5.5 miles from the Long Island railroad bridge between Connecticut and Edwards Avenue to Grangabel Park dam in Riverhead; and
	(b) Approximately 2 miles of the Little River (tributary Tl12-2) from and including Wildwood Lake to its confluence with the Peconic River.
Ramapo River	Approximately 3.5 miles from the Orange County line to the site of an abandoned power dam in the hamlet of Ramapo.
Raquette River	(a) Approximately 22 miles from the outlet of Raquette Lake to the outlet of Long Lake; and
	(b) Approximately 17 miles from the confluence of the Raquette River and a small stream from the northeast, at a point approximately 1 mile downstream from Trombley Landing to the confluence with Dead Creek.
Rock River	Approximately 1.2 miles from the outlet of Lake Durant to the O'Neil flow road crossing.

River Name	River Segment Description
Rivers or Segments Designated as Wild	
St. Regis River, East Branch	Approximately 6.1 miles from a point one-half mile upstream of Everton Falls to the confluence with the Main Branch of the St. Regis River.
St. Regis River, Main Branch	a) Approximately 7 miles from the St. Regis Church to a point where a private road to Bay Pond crosses the Main Branch in Lot 16, Township 17, Macomb's Purchase, Great Tract 1; and
	(b) Approximately 18 miles from the confluence with Balsam Brook to a point at which the river intersects the Adirondack Park boundary.
St. Regis River, West Branch	Approximately 5.5 miles from a point one-half mile downstream of the confluence with Fenner Meadow Brook to a point where the West Branch intersects the Adirondack Park boundary.
Sacandaga River, East Branch	Approximately 14 miles from a point approximately one-half mile above Cook Brook to the confluence with the Main Branch of the Sacandaga River.
Sacandaga River, Main Branch	Approximately 31 miles from the outlet of Lake Pleasant to the inlet of Great Sacandaga Lake.
Sacandaga River, West Branch	(a) Approximately 10.6 miles from the Silver Lake wilderness boundary near the most upstream Route 10 bridge crossing to the confluence with Cow Creek; and
	(b) Approximately 7.2 miles from the confluence of Dugway Creek to the confluence with the Main Branch of the Sacandaga River.
Salmon River	Approximately 12.3 miles from the outlet of Elbow Ponds to the point where the river intersects the Adirondack Park Boundary.
Saranac River, Main Branch	Approximately 60.4 miles from the outlet of Upper Saranac Lake to the point where the river intersects the Adirondack Park boundary.
Schroon River	Approximately 66.7 miles from the outlet of the former Dead Water Pond to the confluence with the Hudson River.
Shawangunk Kill River	From the border of Ulster and Orange Counties to its confluence with the Wallkill River.
West Canada Creek	Approximately 11 miles from the Route 8 bridge crossing near Nobleboro to the Harvey Road bridge crossing.
West Stony Creek	(a) Approximately 6 miles from the Persch Road crossing (to Tannery Road Crossing); and
	(b) Approximately 2.7 miles from the confluence with Hatch Brook to the confluence with the Main Branch of the Sacandaga River.

Source: (NYSDEC, 2015z), (APA, 2013a)

NY APPENDIX B—SPECIES OF CONCERN

Table B-11.2.15-1: S1-Ranked Terrestrial Communities in New York[199]

Vegetative Community Type	USEPA Ecoregion(s)	Description	Distribution
Great Lakes Dune	Eastern Great Lakes Lowland	Grass and shrub community on active and stabilized sand dunes along the shores of the Great Lakes	Primarily on the eastern shore of Lake Ontario, but also on Lake Erie and Lake Champlain
Maritime Heathland	Atlantic Coastal Pine Barrens and Northeastern Coastal Zone	Dwarf shrubland community on rolling outwash[200] plains and moraine[201] of the glaciated portion of the coastal plain	Restricted to eastern Long Island
Maritime Grassland	Atlantic Coastal Pine Barrens and Northeastern Coastal Zone	Grassland community on rolling outwash plains of the glaciated portion of the coastal plain, near the ocean and within the influence of offshore winds and salt spray	Restricted to eastern Long Island
Hempstead Plains Grassland	Atlantic Coastal Pine Barrens and Northeastern Coastal Zone	Tall grassland community on rolling outwash plains in west-central Long Island	Restricted to western Long Island
Riverside Ice Meadow	Eastern Great Lakes Lowlands, Northern Appalachian, and Atlantic Maritime Highlands	Meadow community on gently sloping cobble shores and rock outcrops along large rivers in areas where winter ice floes push up onto the shore, forming an ice pack that remains until late spring	Upper reaches of Hudson River in the Adirondacks, and the St. Regis River, north of the Adirondacks
Wet Alvar Grassland	Eastern Great Lakes Lowlands	Grassland community on very shallow and organic soils over limestone or dolostone[202] bedrock.	In a few outcrops of Chaumont limestone in Jefferson County (east of Lake Ontario)
Dry Alvar Grassland	Eastern Great Lakes Lowlands	Grassland community on very shallow and organic soils over limestone or dolostone bedrock	In a few outcrops of Chaumont limestone in Jefferson County (east of Lake Ontario)
Open Alpine Community	Northern Appalachian and Atlantic Maritime Highlands	Mosaic of sedge/dwarf shrub meadows, dwarf heath shrublands, small boggy depressions, and bedrock outcrops covered in moss and lichens	Adirondack High Peaks subzone of the Adirondacks ecozone (northeastern portion of the Adirondacks)
Serpentine Barrens	Northeastern Coastal Zone	Grass-savanna community on shallow soils on serpentine bedrock outcrops	Restricted to the Manhattan Hills ecozone (lower New York, north of New York City)

[199] Wetland communities are described in Section 11.1.5.
[200] Outwash: "Glacial outwash is the deposit of sand, silt, and gravel formed below a glacier by meltwater streams and rivers. An outwash plain is an extensive, relatively flat area of such deposits." (USEPA, 2015f)
[201] Moraine: "A general term for unstratified and unsorted deposits of sediment that form through the direct action of, or contact with, glacier ice. Many different varieties are recognized on the basis of their position with respect to a glacier." (USEPA, 2015f)
[202] Dolostone: "Sedimentary carbonate rock that contains a high percentage of the mineral dolomite, $CaMg(CO_3)_2$." (USGS, 2014d)

Vegetative Community Type	USEPA Ecoregion(s)	Description	Distribution
Dwarf Pine Plains	Atlantic Coastal Pine Barrens and Northeastern Coastal Zone	Dwarf pitch pine (*Pinus rigida*) and scrub oak woods on nearly level sand and gravel outwash plains	Restricted to eastern Long Island
Dwarf Pine Ridges	Ridge and Valley	Pitch pine and black huckleberry (*Gaylussacia baccata*) woods on flat-topped summits of rocky ridges	Restricted to the Shawangunk Hills subzone of the Hudson Valley ecozone (in a narrow band in the southwestern section of lower New York)
Maritime Pitch Pine Dune Lowland	Atlantic Coastal Pine Barrens and Northeastern Coastal Zone	Maritime woods on stable dunes and back-barrier sand flats	Restricted to Long Island
Pitch Pine-Scrub Oak Barrens	Atlantic Coastal Pine Barrens, Northeastern Coastal Zone, Ridge and Valley, small areas within North Central Appalachians, Northern Allegheny Plateau, Northern Appalachian, and Atlantic Maritime Highlands	Shrub-savanna community on well-drained, sandy soils on dunes (primarily lacustrine dunes), glacial till, and outwash plains	Mostly limited to Long Island and Hudson Valley, with some small examples in the Appalachian Plateau
Post Oak-Blackjack Oak Barrens	Northeastern Coastal Zone	Barrens on upper slopes and low ridges on late cretaceous dunes vegetated with stunted post oak, scarlet oak, and blackjack oak.	Restricted to the Manhattan Hills ecozone (lower New York, north of New York City).
Pitch Pine-Heath Barrens	Eastern Great Lakes Lowlands	Shrub-savanna on well-drained sandy or rocky soils	Restricted to sandplains in northern and north-central New York
Boreal Heath Barrens	Northern Appalachian and Atlantic Maritime Highlands	Dwarf shrubland or shrub-savanna community dominated by heaths or heath-like vegetation	Likely limited to the western Adirondack foothills and Central Adirondacks
Sandstone Pavement Barrens	Northern Appalachian, Atlantic Maritime Highlands (restricted to north and east portions), and Eastern Great Lakes Lowlands	Open woodland on very shallow and acidic soils over sandstone, usually where the bedrock is level, forming a pavement-like surface	Restricted to north and east portions of the Adirondacks, with the most common examples in Clinton County (northeastern corner of New York)
Oak Openings	Eastern Great Lakes Lowlands	Grass-savanna community on well-drained soils	Erie-Ontario Plain subzone of the Great Lakes Plain ecozone

Vegetative Community Type	USEPA Ecoregion(s)	Description	Distribution
Calcareous Red Cedar Barrens	Northern Appalachian and Atlantic Maritime Highlands	Small patches of stunted, sparse woods with small grassland openings with little bluestem (*Schizachyrium scoparium*) and side oats gramma (*Bouteloua curtipendula*), on south- to southwest-facing calcareous[203] bedrock slopes	Associated with Stockbridge Marble outcrops in Columbia County (eastern New York along Massachusetts border)
Ice Cave Talus Community		Cool-climate species growing on the base of talus slopes where cold air is emitted	Limited to Adirondacks and Shawangunk Hills subzone of the Hudson Valley. May also be present in the Catskills
Maritime Beech Forest	Atlantic Coastal Pine Barrens and Northeastern Coastal Zone	Deciduous[204] forest near the coast on north-facing bluffs and the back portions of dunes in well-drained, fine sands	Known only from the Town of Riverhead in Suffolk County (eastern Long Island)
Maritime Holly Forest		Broadleaf, evergreen, maritime forest in low areas in the back portions of dunes	Restricted to the southern fringe of Long Island, possibly only on Fire Island
Maritime Red Cedar Forest		Coniferous forest on dry sites near the ocean	Known only on Long Island
Coastal Oak-Holly Forest		Mixed forest on moist to moderately well drained silt and sandy loams in low areas occurring on morainal plateaus.	Montauk Point, Suffolk County (eastern end of Long Island).

[203] Calcareous: "Of or containing calcium carbonate, calcium, or limestone." (USEPA, 2015f)
[204] Deciduous: "Plants having structures that are shed at regular intervals or at a given stage in development, such as trees that shed their leaves seasonally." (USEPA, 2015f)

ACRONYMS

Acronym	**Definition**
AARC	Average Annual Rate of Change
AASHTO	Association of State Highway and Transportation Officials
ACHP	Advisory Council On Historic Preservation
ACS	American Community Survey
AGL	Above Ground Level
AIM	Aeronautical Information Manual
AIRFA	American Indian Religious Freedom Act
ALB	Albany International Airport
APA	Adirondack Park Agency
AQCR	Air Quality Control Region
ARPA	Archaeological Resources Protection Act of 1979
ASL	Above Sea Level
ASPM	Aviation System Performance Metrics
ATC	Air Traffic Control
ATO	Air Traffic Organization
BCA	Bird Conservation Area
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practices
BUF	Buffalo Niagara International Airport
CAA	Clean Air Act
CAC	Climate Action Council
CBP	Customs and Border Protection
CCMP	Comprehensive Conservation and Management Plan
CEQ	Council On Environmental Quality
CGP	Construction General Permit
CH4	Methane
CIMC	Cleanups In My Community
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COLT	Cell On Light Trucks
COW	Cell On Wheels
CP	Commissioner Policy
CRS	Community Rating System
CSX	CSX Corporation Transportation
CWA	Clean Water Act
DACA	Deployable Aerial Communications Architecture
DEHA	Division of Environmental Health Assessment
DHSES	Division of Homeland Security and Emergency Services
DOC	Department of Commerce
DOC	U.S. Department of Commerce
DoD	Department of Defense
DOE	Department of Energy
DOT	U.S. Department of Transportation
EIA	Energy Information Agency
EMS	Emergency Medical Services
EO	Executive Order
EPCRA	Emergency Planning and Community Right To Know Act
ESA	Endangered Species Act
EWR	Newark Liberty International Airport

Acronym	Definition
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FHWA	Federal Highway Administration
FL	Flight Level
FLM	Federal Land Manager
FSDO	Flight Standards District Offices
FSS	Flight Service Station
GHG	Greenhouse Gas
HAP	Hazardous Air Pollutants
HASP	Health and Safety Plans
HHRA	Human Health Risk Assessment
IBA	Important Bird Areas
IFR	Instrument Flight Rules
IHWDS	Inactive Hazardous Waste Disposal Site
IPCC	Intergovernmental Panel On Climate Change
JFK	John F. Kennedy International Airport
LAMP	Lakewide Action and Management Plans
LBS	Locations-Based Services
LCCS	Land Cover Classification System
LEM	Life Extension and Modernization
LGA	Laguardia International Airport
LID	Low Impact Development
LIRR	Long Island Railroad
LRFD	Load and Resistance Factor Design
LRR	Land Resource Region
LTE	Long Term Evolution
MBTA	Migratory Bird Treaty Act
MHI	Median Household Income
MLRA	Major Land Resource Areas
MMPA	Marine Mammal Protection Act
MMT	Million Metric Tons
MOA	Military Operation Areas
MSFCMA	Magnuson Stevens Fishery Conservation and Management Act
MSL	Mean Sea Level
MTA	Metropolitan Transportation Authority
MTR	Military Training Routes
MYA	Million Years Ago
N2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAS	National Airspace System
NASAO	National Association of State Aviation Officials
NCDC	National Climate Data Center
NEP	National Estuary Program
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NFIP	National Flood Insurance Program
NHA	National Heritage Areas
NHL	National Historic Landmarks

Acronym	Definition
NHPA	National Historic Preservation Act
NIH	National Institute of Health
NIST	National Institute of Standards and Technology
NM	Nautical Miles
NMFS	National Marine Fisheries Service
NNL	National Natural Landmarks
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Disseminated Via Notices To Airmen
NOX	Oxides of Nitrogen
NPCC2	City Panel On Climate Change
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	Nationwide Public Safety Broadband Network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	National Security Areas
NSR	New Source Review
NST	National Scenic Trails
NTFI	National Task Force On Interoperability
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWR	National Wildlife Refuge
NWS	National Weather Service
NYAAQS	New York Ambient Air Quality Standards
NYCAC	New York State Climate Action Council
NYCDEP	New York City Department of Environmental Protection
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules, and Regulations
NYDHSES	New York Division of Homeland Security and Emergency Services
NYOEM	New York City Office of Emergency Management
NYOSC	New York Office of the State Comptroller
NYPA	New York Power Authority
NYS	New York State
NYSARC	New York State Avian Records Committee
NYSDEC	New York State Department of Environmental Conservation
NYSDHSES	New York Division of Homeland Security and Emergency Services
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
NYSDOT	New York State Department of Transportation
NYSDPS	New York State Department of Public Service
NYSERDA	New York State Energy Research and Development Authority
NYSGS	New York State Geological Survey
OE/AAA	Obstruction Evaluation and Airport Airspace Analysis
OIEC	Office of Interoperable and Emergency Communications
OSHA	Occupational Safety and Health Administration
OTR	Ozone Transport Region
PCB	Polychlorinated Biphenyl
PEIS	Programmatic Environmental Impact Statement
PEM	Palustrine Emergent Wetlands
PFO	Palustrine Forested Wetlands
PGA	Peak Ground Acceleration

Acronym	**Definition**
POP	Points of Presence
PPE	Personal Protective Equipment
PSCR	Public Safety Communications Research Program
PSD	Prevention of Significant Deterioration
PSS	Palustrine Scrub-Shrub Wetlands
RCRA	Resource Conservation and Recovery Act
REV	Reforming the Energy Vision
RF	Radio Frequency
RGGI	Regional Greenhouse Gas Initiative
ROC	Rochester International Airport
ROD	Record of Decision
SAA	Sense and Avoid
SAIPE	Small Area Income and Poverty Estimates
SASP	State Aviation System Plan
SASS	Scenic Areas of Statewide Significance
SCEC	State Climate Extremes Committee
SDS	Safety Data Sheets
SEQR	State Environmental Quality Review
SEQRA	State Environmental Quality Review Act
SF6	Sulfur Hexafluoride
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SICG	Statewide Interoperable Communications Grant
SIP	State Implementation Plan
SO2	Sulfur Dioxide
SOW	System On Wheels
SOX	Oxides of Sulfur
SPDES	State Pollutant Discharge Elimination System
SPL	Sound Pressure Level
SSA	Sole Source Aquifers
SUA	Special Use Airspace
SWAP	State Wildlife Action Plan
SWN	Statewide Wireless Network
SWPPP	Stormwater Pollution Prevention Plan
SYR	Syracuse Hancock International Airport
TFR	Temporary Flight Restrictions
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
TWA	Time Weighted Average
UA	Unmanned Aircraft
UAS	Unmanned Aerial Systems
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VFR	Visual Flight Rules
VOC	Ozone
WCS	Wetlands Classification Standard
WI/PWL	Waterbody Inventory/Priority Waterbodies List

Acronym	Definition
WSLPIP	Workplace Safety and Loss Prevention Incentive Program
WSLPP	Workplace Safety and Loss Prevention Program
WSRR	Wild, Scenic and Recreational Rivers
WWII	World War II

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