

NATURAL AREAS AND WILDLIFE IN YOUR COMMUNITY



Hudson River Estuary Program

A Habitat Summary Prepared for the City of Peekskill

This summary was completed in October 2018 to provide information for land-use planning and decision-making as requested by the City of Peekskill. It identifies significant ecosystems in the City, including streams, forests, wetlands, coastal habitats, and other natural areas with important biological values. This summary is based only on existing information available to the New York State Department of Environmental Conservation (DEC) and its partners, and, therefore should not be considered a complete inventory. Additional information about habitats in our region can be found in the *Wildlife and Habitat Conservation Framework* developed by the Hudson River Estuary Program (Penhollow et al. 2006) and in the *Biodiversity Assessment Manual for the Hudson River Estuary Corridor* developed by Hudsonia and published by DEC (Kiviat and Stevens 2001).

Ecosystems of the estuary watershed—wetlands, forests, stream corridors, grasslands, and shrublands—are not only habitat for abundant fish and wildlife, but also support the estuary and provide many vital benefits to human communities. These ecosystems help to keep drinking water and air clean, moderate temperature, filter pollutants, and absorb floodwaters. They also provide opportunity for outdoor recreation and education, and create the scenery and sense of place that is unique to the Hudson Valley. Local land-use planning efforts are instrumental in balancing future development with protection of these resources. By conserving sufficient habitat to support the region's astonishing diversity of plants and animals, communities can ensure that healthy, resilient ecosystems—and the benefits they provide—are available to future generations. For more information on local conservation approaches, see *Conserving Natural Areas and Wildlife in Your Community: Smart Growth Strategies for Protecting the Biological Diversity of New York's Hudson River Valley* (Strong 2008).

The Estuary Program works toward achieving key benefits:

- Clean water
- Resilient communities
- Vital estuary ecosystem
- Fish, wildlife & habitats
- Natural scenery
- Education, access, recreation, and inspiration

This document was created by the New York State Department of Environmental Conservation's Hudson River Estuary Program and Cornell University's Department of Natural Resources. The Estuary Program (<http://www.dec.ny.gov/lands/4920.html>) protects and improves the natural and scenic Hudson River watershed for all its residents. The program was created in 1987 and extends from the Troy dam to upper New York Harbor.

The Estuary Program is funded by the NYS Environmental Protection Fund. The Biodiversity Outreach Program was created in partnership with Cornell University to help Hudson Valley communities learn what plants, animals, and habitats are found locally; understand the value of these resources; and increase their capacity to identify, prioritize, and conserve important natural areas through informed decision-making. Additional information about habitats in the Hudson Valley can be found on DEC's webpages, starting with www.dec.ny.gov/lands/5094.html.

CONTACT INFORMATION

Nate Nardi-Cyrus

Conservation and Land Use Specialist

New York State Department of Environmental Conservation

21 South Putt Corners Rd, New Paltz, NY 12561
845-256-3062 | nate.nardi-cyrus@dec.ny.gov



Cornell University



Department of Environmental Conservation

Contents

■ Introduction.....	3
Summary Content.....	3
How to Use this Summary	4
Limitations of Maps in this Summary	4
How to Find More Information	4
Conservation.....	5
■ Important Habitats in the City of Peekskill	6
Regional Context (Figure 1).....	6
Major Ecological Features (Figure 2).....	7
Lower Hudson Important Bird Area (IBA).	7
Areas of Known Importance for Rare Plants, Rare Animals, and Significant Natural Communities.	7
Stream Habitat for Migratory Fishes.	8
Wetlands (Figure 3)	8
Streams and Floodplains (Figure 4)	9
Riparian Buffers.	10
Floodplains.....	10
Hudson River Coastal Habitats (Figure 5).....	10
Significant Coastal Fish and Wildlife Habitat.	10
Tidal Hudson River Estuary Wetlands.	11
Underwater (Subtidal) Habitats.	11
Tidal Shoreline Status.	11
Potential Tidal Wetlands.	11
Forests (Figure 6)	12
Shrublands, and Young Forests (not mapped).....	13
■ Table 1. Species and Habitats of Conservation Concern in the City of Peekskill, NY	20
■ References.....	24
■ Appendix A.....	26

Introduction

The Hudson River Estuary and its watershed is a region of remarkable beauty, historical and economic significance, and high biological diversity. The region, comprising only 13.5% of the land area in New York, contains nearly 85% of the bird, mammal, reptile, and amphibian species found in the state (Penhollow et al. 2006). Local municipalities can play a key role in conserving this natural heritage and the ecological processes that sustain it. By identifying important areas for habitat and wildlife, municipalities are better equipped to pursue conservation opportunities and make informed land-use decisions. This proactive approach to planning can help municipalities avoid the costs of urban and suburban sprawl, maintain community character and quality of life, and preserve the many benefits, or ecosystem services, that healthy, natural systems provide to present and future generations.

*An **ecosystem** is a community of animals and plants interacting with one another and with their physical environment.*

***Ecosystem services** are life-sustaining benefits we receive from nature, such as food, medicine, water purification, flood control, and pollination. Many of these services are provided for “free,” yet are worth many trillions of dollars.*

- Ecological Society of America

Summary Content

This summary includes complementary text, maps, and tables. The [Habitat Summary text](#) describes what is known about the City’s important natural areas and habitats based on information in DEC’s databases and a review of local studies available at the time of writing. The text details the information in the maps, including the ecological importance of the data and its sources. There are six habitat maps for the City of Peekskill, which follow the text headings:

[Figure 1: Regional Context](#) of the City of Peekskill, NY

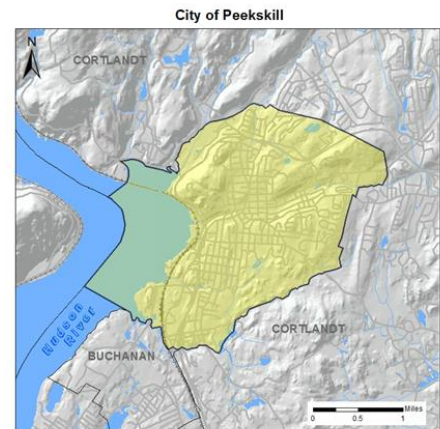
[Figure 2: Significant Ecological Features](#) in the City of Peekskill, NY

[Figure 3: Wetlands](#) in the City of Peekskill, NY

[Figure 4: Streams and Floodplains](#) in the City of Peekskill, NY

[Figure 5: Hudson River Coastal Habitats](#) in the City of Peekskill, NY

[Figure 6: Forests](#) in the City of Peekskill, NY



Descriptions of shrubland and young forest habitats are included in the text but are not mapped. Following the maps, [Table 1](#) lists known **Species and Ecosystems of Conservation Concern** that have been recorded for Peekskill, including species listed in New York (NY) or federally (US) as [endangered](#), [threatened](#), [special concern](#), [rare](#), a [Species of Greatest Conservation Need](#) (SGCN), or a [Hudson River Valley Priority Bird](#) species. SGCN are species identified in the State Wildlife Action Plan that are experiencing some level of population decline, have identified threats that may put them in jeopardy, and need conservation actions to maintain stable population levels or sustain recovery (NYSDEC 2015). High priority SGCN are species in need of timely management intervention or they are likely to reach critical population levels in New York within 10 years. Audubon New York identified the Hudson River Valley priority birds by assessing continental, national, and regional bird planning initiatives in addition to state and federal priority designations.

At the end of the summary, [references](#) identify the sources of information in this document and places to find more information. [General conservation measures](#) for protecting natural areas and wildlife are also provided.

Links in the summary will direct you to websites, publications, and fact sheets for supplemental information. A complementary online map application, the [Hudson Valley Natural Resource Mapper](#), can be used for more interactive viewing of mapped features in the habitat summary. Attribute information for many of the individual features is available in the mapper, along with links to more information.

Please note that some habitats and species identified in this document may be protected by state or federal programs. The [Environmental Resource Mapper](#) on DEC's website can help identify those resources. Please work with DEC's Region 3 Office in New Paltz and other appropriate entities as necessary.

How to Use this Summary

This summary provides a starting point for recognizing important natural areas in the City and surrounding areas, but is limited to existing information and is not a substitute for on-site survey and assessment. Information provided should be verified for legal purposes, including environmental review. Effective conservation occurs across property and political boundaries and, therefore, necessitates a broader view of natural landscapes. By identifying areas with high-quality resources, this summary will be especially useful for setting priorities to inform municipal planning. Habitat summaries like this have been used by communities for open space plans, comprehensive plans, natural resource inventories, and other conservation and planning actions. One Hudson Valley town used the species lists in its comprehensive plan's generic environmental impact statement, another to designate critical environmental areas. Some communities have incorporated their summaries directly into plans, while others refer to the information when writing their own documents. Together they provide critical information for local land-use decisions, including economic development and conservation.

Though this summary does not contain adequate detail for site planning purposes, it can be useful for environmental review. First, by identifying high quality habitats on a municipal-wide scale, it helps land-use decision-makers and applicants understand how a proposed site plan might relate to important natural areas on- and off-site. Second, the summary highlights areas that may require more detailed assessment to evaluate potential impacts. Third, the tables identify species of conservation concern that may warrant special attention during reviews. If it's not already a routine step, the planning board should consider requiring applicants to produce a current letter from the [New York Natural Heritage Program](#) that identifies rare plants, rare animals, and significant ecosystems that are known to be on or near a proposed development site. The planning board and applicants should also work closely with DEC Region 3 Permits staff to ensure regulatory requirements are met.

Limitations of Maps in this Summary

Maps included here were created in a geographic information system or GIS. Information on the maps comes from different sources, produced at different times, at different scales, and for different purposes. It is often collected or developed from remote sensing data (i.e., aerial photographs, satellite imagery) or derived from paper maps. For these reasons, GIS data often contain inaccuracies from the original data, plus any errors from converting it. Therefore, maps created in GIS are approximate and best used for planning purposes. They should not be substituted for site surveys. Any resource shown on a map should be verified for legal purposes, including environmental review.

How to Find More Information

Most of the GIS data presented in the Habitat Summary maps may be obtained for free from the [New York State GIS Clearinghouse](#) or from other public websites. The summary can be enhanced by local knowledge. Local studies, maps, plans, and knowledgeable residents can provide details and may reveal previously unknown, high-quality ecosystems. Biological information in environmental impact statements may also be useful, especially when a municipality has habitat standards for environmental review. This summary draws on information from a biodiversity plan, produced by the Metropolitan Conservation Alliance (Miller & Klemens 2004), of neighboring towns including Putnam Valley, Cortlandt, Yorktown and a portion of New Castle. For help with incorporating additional information into the summary, please contact Nate Nardi-Cyrus, Hudson River Estuary Program Conservation and Land Use Specialist.

Guidance and suggestions for developing a more comprehensive natural resources inventory are available in [Creating a Natural Resources Inventory: A Guide for Communities in the Hudson River Estuary Watershed](#) (Haeckel and Heady 2014). This handbook outlines how to inventory valuable natural and cultural assets and strategies for using natural resource information in local land-use and conservation planning. Limited hard copies are available upon request for municipalities.

Conservation

Once important habitats and natural areas are identified, municipalities have numerous options to strengthen their protection, such as incorporating maps and data into comprehensive plans and zoning, developing critical environmental areas or conservation overlay districts, adopting resource protection regulations, and acquiring conservation easements for sensitive habitats, such as floodplains or wetlands and their buffers.

Included with this summary are [General Conservation Measures for Protecting Natural Areas and Wildlife](#) that can help guide Peekskill's plans and land-use decisions. Additional information on the how and why of local habitat conservation is available in [Conserving Natural Areas in Your Community: Smart Growth Strategies for Protecting the Biological Diversity of New York's Hudson River Valley](#) (Strong 2008). This handbook was published by DEC and details why towns should conserve their biological resources, as well as the tools and techniques local governments can use to conserve natural areas and wildlife. Chapter 5 covers habitat conservation. The document is available on a CD or in hard copy upon request.

Technical assistance is available through the Estuary Program, including help with incorporating natural resource conservation principles and information into municipal land-use planning procedures, plans, and policies. The Estuary Program and its partners also provide training to local leaders to recognize and map ecologically significant habitats and communicate their importance to the community. The [Hudson River Estuary Grants](#) program supports projects that continue to raise the capacity of municipalities, land trusts, and non-profits to identify and assess watershed biodiversity, promote stewardship and conservation of vital habitats, and create local conservation programs. For more information on technical assistance opportunities, please contact Nate Nardi-Cyrus.

Important Habitats in the City of Peekskill

Regional Context (Figure 1)

The first step to understanding the natural areas and habitats of Peekskill is to consider how the City relates to the ecological features that extend beyond its borders. Most of the City's land area drains directly to the Hudson River Estuary via minor streams and stormwater drains. The northernmost portions of the City drain into Annsville and Peekskill Hollow Creeks. These tributaries converge along the northern boundary of Peekskill where they drain into the brackish (a combination of fresh water and salt water) portion of the Hudson River Estuary.

A watershed is the area of land where all of the water that is under it, or drains off of it, goes into the same stream, river, lake, or other waterbody.

– U.S. Environmental Protection Agency

The northern third of Peekskill is within the Hudson Highlands Significant Biodiversity Area (SBA), a priority designation made by the NYS Department of Environmental Conservation (DEC) Hudson River Estuary Program (Penhollow et al., 2006):

“The Highlands are noteworthy as a relatively undeveloped corridor of forests, wetlands, and grasslands of regional importance to breeding and migratory birds, resident amphibians and reptiles, and rare plants and communities close to the New York City metropolitan area. It is significant for its high concentration of species and communities of special regional emphasis dependent on large, unfragmented forest and wetland habitats.”

Significant Biodiversity Areas (SBAs) are locations of high concentration of biological diversity or value for regional biodiversity, described in [The Hudson River Estuary Wildlife and Habitat Conservation Framework](#) (Penhollow et al. 2006).

Because of its urban nature, much of the City does not reflect this description. However, land-use within Peekskill, especially in areas adjacent to Annsville and Peekskill Hollow Creeks, can greatly affect the above described resources.

Peekskill is bordered to the west by the tidal Hudson River estuary and to the north and south by brackish tidal wetlands associated with tributary mouths. The Mid Hudson River Estuary is also identified as an SBA and is a regionally rare ecosystem that supports many uncommon species as well as regionally important fisheries (Penhollow et al., 2006):

“The productive and regionally significant Mid-Hudson River estuary is generally fresh water in winter and has low salinity in summer. This section encompasses regionally significant spawning migratory and nursery habitat for anadromous, estuarine, and freshwater fish, important winter feeding and roosting areas for the federally listed threatened bald eagle, and globally and regionally rare brackish and freshwater tidal communities and plants. The open water and tidal wetlands in this reach are spawning and nursery habitats and a migratory pathway between the upper and lower estuary for anadromous and resident fish...The numerous creeks and tidal brackish and freshwater marshes in this stretch serve as breeding, nursery, and migration corridors for fish and wildlife.”

All of the City's Hudson River shoreline and some tidal wetlands are within the SBA and include important habitats for migratory fishes and the federally listed bald eagle.

Two miles south of Peekskill, the Hudson River is designated as the Lower Hudson River Estuary SBA:

“This section of the Hudson is generally the zone of greatest mixing of river water and ocean water. The lower Hudson is rich in benthic resources and provides a significant nursery for fish populations. It is an important source of food resources for populations of wintering and migratory birds. This stretch of the river has significant concentrations of wintering waterfowl, especially canvasback. Other important animal species living in this area include osprey, fiddler crabs, blue crab, and diamondback terrapin. There are several regionally significant plants that occur in the Lower Hudson including the state endangered cylindrical headed bulrush.”

The City lies within a natural transition zone between the lower and mid-reaches of the Estuary and is therefore important to both designated SBAs.

Major Ecological Features ([Figure 2](#))

Figure 2 shows the major ecological features known to occur in Peekskill, including significant coastal fish and wildlife habitat, areas of known importance for rare animals, rare plants, and significant natural communities, submerged aquatic vegetation (SAV) and stream habitat for migratory fishes. Although not shown on the map, this section of the Hudson River is also designated by Audubon New York as a statewide Important Bird Area. Figure 2 and the corresponding descriptions below are based on limited information and more study of the City is needed to better describe Peekskill's natural features. Overlapping layers in the map may be viewed in greater detail using the [Hudson Valley Natural Resource Mapper](#).

Lower Hudson Important Bird Area (IBA). Audubon New York has identified the Lower Hudson River as an area of statewide importance for priority grassland birds (Primarily at Croton Point Park in Croton-on-Hudson, NY) and wintering bald eagles. The IBA extends from Croton Point Park to just north of the Newburgh-Beacon Bridge. An [ornithological summary](#) from Audubon states that this portion of the Hudson River is “one of the most critical wintering Bald Eagle sites in the state, and [is] becoming an important breeding area for Bald Eagles.” The summary recommends protecting winter roost sites, given that this area supports about 10% of the state's wintering bald eagle population.

Areas of Known Importance for Rare Plants, Rare Animals, and Significant Natural Communities. NYNHP has identified areas of importance for sustaining populations of rare plants, rare animals, and significant natural communities based on existing records and the species' habitat requirements. Important Areas include the specific locations where species have been observed, as well as areas critical to maintaining the species' habitat or the integrity of the significant natural community. Proactive planning that considers how species move or disperse across the landscape, with careful attention to maintaining connected habitat complexes, will contribute to the long-term survival and persistence of rare species and significant natural communities. NYNHP identified areas of importance in Peekskill for bald eagle, diadromous fishes, and freshwater mussels, as well as for spongy arrowhead, a rare plant. A complete list of state rare plants and animals and significant natural communities known from Peekskill is shown in [Table 1](#).

NY-threatened [bald eagle](#) nesting and overwintering occurs in Peekskill's coastal habitats. While bald eagle breeding and non-breeding populations are increasing in New York, development pressure and its impacts on habitat remain significant threats. Nesting sites are sensitive to human disturbance.

[Atlantic needlefish](#) is a salt-water fish that spends parts of its life in brackish and freshwater portions of the tidal Hudson River. NYNHP has records of Atlantic needlefish from New York Harbor to as far north as Germantown in Columbia County. While this species is not state or federally listed, recent population declines have been observed in association with the loss of SAV.

Diadromous fish refer to species that migrate between the sea and freshwater. NY-endangered [shortnose sturgeon](#), NY-Endangered [Atlantic sturgeon](#), blueback herring, alewives, and American eel are diadromous fishes of the City's Hudson River coastal habitats and are discussed further in the following sections. Those that return to freshwater habitats to spawn are also referred to as anadromous and include the sturgeon and herring species. Stream reaches used by blueback herring, alewives, and American eel are shown in [Stream Habitat for Migratory Fishes](#).

[Brackish intertidal mudflats](#) are sparsely vegetated mudflats along brackish portions the Hudson River and its tributary mouths. These wetland communities are important for habitat specialists, including the NY-threatened [spongy arrowhead](#), which has been documented within tidal portions of Annsville Creek.

Note: Rare plants, animals and communities may occur in more locations than are currently known by NYNHP or DEC. The DEC Region 3 Office in New Paltz should be contacted at (845) 256-3000 with any concerns or questions about the presence of protected species in Peekskill.

Stream Habitat for Migratory Fishes. DEC Bureau of Fisheries data and an aquatic habitat connectivity study by NYNHP indicates that Annsville Creek, Peekskill Hollow Creek, Dickey Brook and their associated tributaries (highlighted in Figure 2) comprise migratory routes and spawning habitat for river herring (blueback herring and alewives) (White et al. 2011). River herring spend most of their time in coastal waters and return to the fresh water of the Hudson River each spring to spawn before returning back to ocean waters. American eel, also identified in Peekskill's tributaries according to DEC surveys, is a fish species that begins life in the Atlantic Ocean and migrates to the headwaters of North American tributary streams as tiny "glass eels". American eel is in decline throughout much of its range, and though eels are able to bypass certain dams, culverts, and other aquatic barriers, they rely on aquatic connectivity along streams to complete their life cycle and return to the sea to spawn.

Wetlands (Figure 3)

There are many types of wetlands in the Hudson River Estuary watershed, including wet meadows, emergent marsh, forested and shrub swamps, vernal pools, floating and submerged vegetation, and open water, as well as the variety of tidal wetlands. Each wetland type provides habitats for different assemblages of plants and animals. Many wildlife species depend upon wetlands for part of their life cycle, including many species of conservation concern in New York State. In addition to providing critical habitat for many plants and animals, wetlands provide important services for human communities. They help to control flooding and reduce damage from storm surge, recharge groundwater, act as filters to cleanse water of impurities, and provide recreation opportunities. The upland area surrounding a wetland is essential to its survival and function; both may diminish when a wetland is surrounded by pavement, buildings, and pollution-generating or other incompatible land uses (Environmental Law Institute 2008).

Wetlands are areas saturated by surface or groundwater sufficient to support distinctive vegetation adapted for life in saturated soil conditions.

Knowing about local wetlands enables municipalities to proactively plan to conserve this critical part of our life support system. Although several existing maps provide the approximate locations and extent of wetlands, they are inherently inaccurate and not a substitute for site visits and on-the-ground delineation. Nonetheless, towns can use these maps as a starting point for inventorying local wetlands and supplement them with more refined data as they become available.

In Figure 3, "known wetlands" are shown from the U.S. Fish and Wildlife Service's (USFWS) [National Wetlands Inventory \(NWI\)](#) and DEC's [Freshwater Wetlands Program](#) maps (which only include wetlands larger than 12.4 acres, unless designated "of unusual local importance"). Open water habitats including the Hudson River are symbolized in blue as "waterbodies." NWI data are available for viewing on the [NWI Wetlands Mapper](#) or as a [download](#) for use in geographic information systems (GIS). NYS freshwater wetland maps are available for viewing using the [Environmental Resource Mapper](#) or to download as GIS files at the [NYS GIS Clearinghouse](#). County soil maps are also a good source for predicting the location of potential wetlands. "Probable wetlands" are those areas classified in the soil survey as very poorly drained or poorly drained soils, and "possible wetlands" are those classified as somewhat poorly drained (after Kiviat and Stevens 2001). Note that in Figure 3, probable and possible wetlands cover a greater area than NWI and DEC wetland layers. NWI maps often underestimate wetland area and omit smaller and drier wetlands (Zucker and Lau 2009). Vernal pools, wet meadows, and swamps are often under-represented on maps. Many of DEC's regulatory maps are outdated and have similar inaccuracies (Huffman and Associates 2000). Likewise, note that soil units are only mapped to an approximate area of about two acres, and that soils within the unit may not be homogeneous. Thus, areas shown as supporting probable or possible wetlands should always be verified in the field for the purposes of environmental review.

Within Peekskill, there are very few confirmed wetlands outside of ponds, lakes and wetlands adjacent to large watercourses (i.e. Annsville Creek, Peekskill Hollow Creek, and Dickey Brook). This is likely due to historic wetland filling associated with the growth of many urban areas. The NWI identifies the largest concentrations of known wetlands within Depew Park and Fort Hill Park. While NWI maps offer some general information on Peekskill's wetland habitats (e.g., forested, emergent, mudflats), most existing map resources focus on wetland locations and do not yield information about habitat or importance for biodiversity. Communities can learn more about habitat values by conducting local surveys and studies.

Vernal pools are small, isolated wetlands that are often dry in summer. They provide habitat for many animals, including forest amphibians like wood frog and several salamander species, which use the pools for breeding. Vernal pools often go undetected in the forest due to their small size and seasonal drawdown, and are vulnerable due to reduced regulatory protection of isolated wetlands (see [Conserving Small Wetlands in the Hudson Valley](#) for more information). Although no vernal pools have been identified in Peekskill, records of NY-special concern marbled salamander and the non-listed spotted salamander in the NY Amphibian and Reptile Atlas attest to the presence of vernal pools in or near the City. In the Croton-to Highlands Biodiversity Plan (Miller and Klemens 2004), the adjacent Blue Mountain Reservation was identified as a biodiversity hub in part due to the presence of these vernal pool obligates (species who require vernal pools to complete their lifecycles). A biodiversity assessment in the City might reveal additional wetland habitat types and provide detail on quality and habitat use. Knowing there may be unmapped vernal pools in Peekskill, outreach to landowners with potential habitat may help promote stewardship and land-use decisions that protect the pools, surrounding forest habitat, and associated wildlife. Specific management recommendations can be found in [Best Development Practices: Conserving Pool-Breeding Amphibians in Residential and Commercial Development in the Northeastern United States](#) (Calhoun and Klemens 2002) and [Maine Municipal Guide to Mapping and Conserving Vernal Pool Resources](#) (Morgan and Calhoun 2012)

Streams and Floodplains (Figure 4)

[Streams](#), their floodplains, adjacent wetlands, and other “riparian” or streamside habitats that occur along their channel provide important ecosystem services to communities, including clean water, flood management, and recreational opportunities like fishing and kayaking. In addition, Hudson River tributary streams and their associated shoreline and floodplain areas provide some of the most productive wildlife habitat in the region. The health of the Hudson River Estuary is closely linked to the health of its tributaries and their watersheds (Penhollow et al. 2006).

All of the land in Peekskill ultimately drains to the Hudson River (see Figure 4). The majority of the City's area drains directly to the Hudson River and its associated tidal wetlands via minor streams and the City's stormwater sewers. The northern portion of Peekskill drains into Peekskill Hollow and Annsville Creeks. Streams and waterbodies shown on maps in this summary are from the 1:24,000 National Hydrography Dataset for New York State and were digitized from air photos. Note the resulting maps have inherent inaccuracies and will not capture intermittent streams. Intermittent streams are in fact widespread, accounting for an estimated 59% of total stream length in the United States. The US Environmental Protection Agency and has compiled extensive scientific reviews highlighting their essential role in maintaining water quality and overall watershed function or health (Levick et al. 2008). Intermittent streams also play a vital role in dissipating stream energy during storms and reducing erosion and downstream flood impacts. Visiting sites and creating more accurate maps are methods to pursue to ensure that intermittent streams are identified and considered during planning and project review.

Intermittent streams only flow seasonally or after rain. They can easily be overlooked when dry, but have great impact on larger downstream waters and warrant attention. Many flow directly into the Hudson and its tributaries, wetlands, and other water bodies, influencing water quantity and quality.

Riparian Buffers. Effective stream conservation and restoration occurs beyond stream channels and banks. Figure 4 shows riparian buffer zones, which were developed by the New York Natural Heritage Program (Conley et. al. 2018) using the Riparian Buffer Delineation Model (Abood et al. 2012). The riparian buffers highlight important streamside areas that influence stream dynamics and health. Riparian buffers intercept stormwater runoff, filter sediment and nutrients, and help attenuate flooding. Forested buffers provide organic matter that supports the in-stream food web and shade that helps maintain cool water temperatures. They also support unique and diverse habitats, and serve as wildlife travel corridors (Knab-Vispo and Vispo 2010). The riparian buffer zones were mapped around streams based on digital elevation data, known wetlands, and modeling for the 50-year flood zone. The riparian buffers overlap with FEMA floodplain data in the map and are available for viewing in greater detail using the Hudson Valley Natural Resource Mapper. Note that the riparian buffers were developed through modeling and have not been field verified. Nevertheless, they can provide a starting point to inform land use strategies and stream protection efforts. The Hudson River Estuary Program’s “Trees for Tribs” initiative offers free consultation and native trees and shrubs for qualifying streamside buffer planting projects in the estuary watershed.

Floodplains. Floodplains are a particularly important component of riparian areas, especially where forested or undeveloped. Natural floodplains provide space streams need to expand, contract, and sometimes change course, and they promote groundwater recharge. Furthermore, they safeguard human settlement from the damaging impacts of flood events. Floodplain information included in Figure 4 comes from the [Federal Emergency Management Agency \(FEMA\) Digital Flood Insurance Rate Map \(DFIRM\) Database](#). In 2014, FEMA updated the flood hazard maps for Westchester County to reflect physical changes in floodplains, new data, and improved modeling capabilities. Zones estimated by FEMA to have a 1% chance or greater probability of being inundated in any given year (often referred to as the “100-year flood”), include wide areas along Annsville Creek and the Hudson River waterfront. Another prominent floodplain runs parallel to Main Street and appears to be associated with a stream buried beneath Park Street and Central Ave.

*Floodplains are low-lying areas adjacent to streams and rivers that can become inundated during heavy precipitation or snow melt. **The floodway** is the channel of a stream or river that carries the deepest, fastest water downstream.*

There is a much smaller area of higher floodplain that has a .2% chance or greater probability of being inundated in any given year (often referred to as the “500-year flood”). Both 100 and 500-year floodplains have been heavily developed and experience regular flood damage. Changes in precipitation patterns and sea level rise (SLR), both associated with climate change, are anticipated to increase flood risk to new areas outside of existing mapped floodplains. [Scenic Hudson’s SLR Mapper](#) is a useful tool for identifying expanded floodplains under a variety of predicted scenarios.

It is important to note that the FEMA-mapped floodplains, and their statistical flooding intervals, are estimations based on the data and technology available at the time of mapping. Due to many variables, such as the unpredictable nature of some kinds of floods, local drainage problems, SLR and the variable intensity of land development in watersheds, some flood-prone areas may not appear on the maps. Nonetheless, the mapped floodplains provide a starting point for proactive conservation planning.

Hudson River Coastal Habitats ([Figure 5](#))

Connections to upper watersheds, the Atlantic Ocean, and the changing tides make the coastal and shoreline zones of the Hudson River Estuary a dynamic area. Conditions throughout this reach of the estuary are both brackish and freshwater (depending on recent precipitation patterns and tides), supporting a large diversity of natural communities that are adapted to both fresh and salt water. The City of Peekskill’s coastal habitats and general shoreline type along the tidal Hudson are shown in Figure 5.

Significant Coastal Fish and Wildlife Habitat. The DEC has identified and evaluated coastal habitats throughout the state’s coastal regions, providing recommendations to the NYS Department of State so that the most important or “significant” habitats may be designated for protection in accordance with the

Waterfront Revitalization and Coastal Resources Act. Within Peekskill, the deepest portion of the Hudson River is designated as the Hudson Highlands Significant Coastal Fish and Wildlife Habitat. This area provides important habitat for federally listed Atlantic and short-nosed sturgeon and a variety of other fresh and salt water migratory fishes.

Tidal Hudson River Estuary Wetlands. The wetlands at the mouth of the Annsville Creek and Dickey Brook are both brackish and tidal, a regionally rare ecosystem type. Tidal wetlands serve a very important purpose in the river, providing habitat for rare plants and young fish and other benefits for people like wastewater dilution/purification and protecting shorelines from waves and strong storms. Figure 5 shows tidal wetlands mapping from a 2007 inventory by DEC, which identified about 7 acres of tidal wetlands in Peekskill in Annsville Creek, Peekskill Hollow Creek and Dickey Brook. This figure does not include submerged aquatic vegetation (SAV). Rare plant species have been documented from these coastal habitats and are listed in Table 1.

Underwater (Subtidal) Habitats. Beds of SAV were historically found throughout Peekskill Bay and the tidal portions of Annsville Creek and Dickey Brook. Native water celery has been the only species observed in these waters during DEC's periodic SAV surveys but its population has contracted significantly since surveys began in 1997. The latest 2014 survey identifies patches on the eastern side of the rail causeway at the Annsville Creek outlet and within the tidal mouth of Dickey Brook. Native SAV improves water quality by trapping fine sediment and organic matter and maintaining dissolved oxygen levels. It also provides essential habitat for invertebrates supporting the rich diversity of fish and waterfowl that use the estuary. The areas mapped indicate locations where SAV growth has been documented and needs protection, even though in any given year the SAV may not be present.

Tidal Shoreline Status. Natural shorelines are an important transition zone between water and land and provide habitat for diverse plants, fish and wildlife. Tidal shorelines comprise lands directly on the Hudson River as well as the shorelines of tidal wetlands, tidal tributaries, and coves, including both naturally vegetated and hard engineered shoreline. Peekskill has nearly 3 miles of tidal shoreline directly along the Hudson River, and an additional 2 miles along the south bank of Annsville Creek and the north bank of Dickey Brook. Figure 5 shows general shoreline type according to a 2005 inventory of Hudson River shoreline status by the DEC and the Hudson River National Estuarine Research Reserve. The study identified 1.4 miles of hard engineered shoreline along the Hudson River in Peekskill, including bulkhead and rip-rap revetment, most of which is associated with the rail line. The remaining 1.5 miles of natural shoreline support primarily woody vegetation or unvegetated rock, sand, and gravel.

Municipalities can evaluate tidal shoreline status to identify places where natural shorelines can be conserved or where the ecology of engineered shorelines could be enhanced. There are opportunities to conserve, restore, and manage shoreline habitats throughout the Peekskill waterfront area and along adjacent tidal creeks and brooks. Parks, preserves, and regulated wetlands may offer a starting point to conserve or restore natural shorelines that will allow tidal wetlands to move with SLR. Even along working waterfronts there are ways to improve the habitat value of bulkheads and rip-rap revetments. [The Hudson River Sustainable Shorelines Project](#) provides information and tools on enhancing the ecology of built shorelines as well as how to conserve natural shorelines.

Potential Tidal Wetlands. The Hudson River Estuary is connected to the Atlantic Ocean and affected by SLR due to climate change. The Hudson has already risen by one foot since 1900 and is likely to rise an additional 3-6 feet by 2100 (Horton et al. 2014). Such a rapid change in water levels threatens waterfront development and infrastructure as well as the future of tidal wetlands. Tidal wetlands along the Hudson River will disappear with SLR unless they can build up in place or move to higher ground. However, wetlands bordered by steep shorelines or existing development may have no place to go. Potential tidal wetland loss threatens the health of the entire estuary. A recent study by Scenic Hudson shows areas along the Hudson most likely to support tidal wetlands in the future as sea level rises (Tabak et al. 2016). The study shows that the location of Peekskill's tidal wetlands will likely change by 2100.

The Potential Tidal Wetland Pathways in Figure 5 show where tidal wetlands are likely to move by 2100 as sea level rises. Tidal wetlands are projected to expand in low lying areas along tidal zones. Steep shorelines are a barrier to wetland movement in many areas; in others, existing roads, railroads, and development pose a physical barrier. The wetland pathways do not account for all of the barriers that may be present; for example, bulkheads and revetment may be a barrier to inland wetland migration along some stretches of Peekskill's Hudson River shoreline. Tidal wetland pathway data may be viewed in more detail using the [Protecting the Pathways](#) interactive map.

The most effective way for a municipality to conserve tidal wetlands in the face of these changes is to protect and manage the areas where wetlands may move. Minimizing future development in the pathways and designing public waterfronts to allow for these changes will ensure that tidal wetlands have room to adapt to rising sea levels. This strategy will also reduce risks to communities and property owners in the changing Hudson River flood zone. For more information, see *Protecting the Pathways: A Climate Change Adaptation Framework for Hudson River Estuary Tidal Wetlands* (Tabak and Spector 2016). SLR projections for the City's waterfront can be viewed using Scenic Hudson's SLR Mapper.

Forests (Figure 6)

The ability of forests to provide wildlife habitat, clean water, climate moderation, and economically viable forest products depends in part on our ability to maintain sizeable tracts of forest. In general, larger forests provide more ecosystem services and higher quality forest habitat than smaller ones. However, the value of each forest is relative to the values of other forests in the community, watershed, or natural landscape. Even small patches of forest can be extremely valuable depending on different factors, such as their relationship to the surrounding landscape. For example, a network of forest patches along a stream can create a riparian corridor that helps maintain water quality and wildlife habitat, and that serves as a travel route for forest animals.

Figure 6. shows forest patches in Peekskill. The map was created from land cover data developed for the Coastal Change Analysis Program (National Oceanic and Atmospheric Administration 2010). Land cover categories considered 'forest' for this analysis included deciduous forest, evergreen forest, mixed forest, and palustrine forested wetland. Roads were buffered and removed from forest patches to show results of development-related fragmentation. Interstate roads were buffered by a total of 300 feet and state and county roads by 66 feet. Forest patch size classifications follow the Orange County Open Space Plan (Orange County Planning Department 2004) as cited in Strong (2008).

Peekskill's forests are generally small compared to the large adjacent tracts in the Hudson Highlands; however, there remain sizeable patches of forest habitat in the more undeveloped parts of the City, as well as small patches and street trees that contribute to a better quality of life in residential areas. Peekskill's most notable forest lies within Depew Park and continues south into Blue Mountain Reservation in Cortlandt, measuring, in total, approximately 2,500 acres. This forest was identified by the Croton-to-Highlands Biodiversity Plan as a Biodiversity Hub because of its large size and high biodiversity when compared to the surrounding urban and suburban landscape of Westchester County. The report identified development-sensitive species including marbled salamanders, spotted salamanders, wood frogs, black rat snakes, barred owls, wood thrushes, ovenbirds and Louisiana waterthrushes to name a few (Miller and Klemens 2004).

Forest fragmentation is the process of breaking large patches of forest into smaller areas, often by clearing it for new roads or development. Fragmentation decreases forest habitat quality and health, disrupts wildlife movement, and facilitates the spread of invasive species. These impacts are greatest at forest edges but can extend for hundreds of feet into forest patches, often displacing sensitive species that depend on interior forest.

While not within the City limits, locally and globally important forests are immediately adjacent to Annsville and Peekskill Hollow Creeks to the north. These forests were also identified in the Croton-to-Highlands Biodiversity Plan, given the occurrence of NYS-species of special concern eastern box turtle and [eastern wormsna](#)ke, as well as a suite of other development-sensitive species.

The 200-acre threshold is often considered the minimum size for intact forest ecosystems. In forests smaller than this threshold habitat viability for forest interior bird species declines and impacts from development, micro-climatic differences, and other disturbances at the forest edge dominate (e.g. increased predation levels and invasive species prevalence). There are many forest patches under 200 acres in the City, all of which provide some wildlife habitat, manage stormwater, moderate temperature and improve air quality. Street trees can also provide many of these same benefits and are an important component of urban biodiversity. The 109-acre forest associated with Fort Hill Park is a small, but significant, forest patch. In addition to benefiting the City in the ways noted above, this forest directly buffers the ecologically-significant Annsville Creek from pollutants carried by storm water.

The [NYS Breeding Bird Atlas](#) has several records of birds that indicate the availability of high-quality forest habitat (e.g., red-shouldered hawk, cerulean warbler, wood thrush) in or near Peekskill (see [Table 1](#)). Conserving adequate forest in the City to sustain populations of these species will help other wildlife and contribute to preserving the ecosystem services that the City's forests are providing to its residents. Audubon New York's website has specific information on [managing habitat for forest birds](#).

White-nose syndrome (WNS)
is caused by a fungus that is often visible on the bats muzzle and wings...Bats wake from hibernation and burn fat reserves that are needed to survive the winter and they become emaciated (NYNHP)

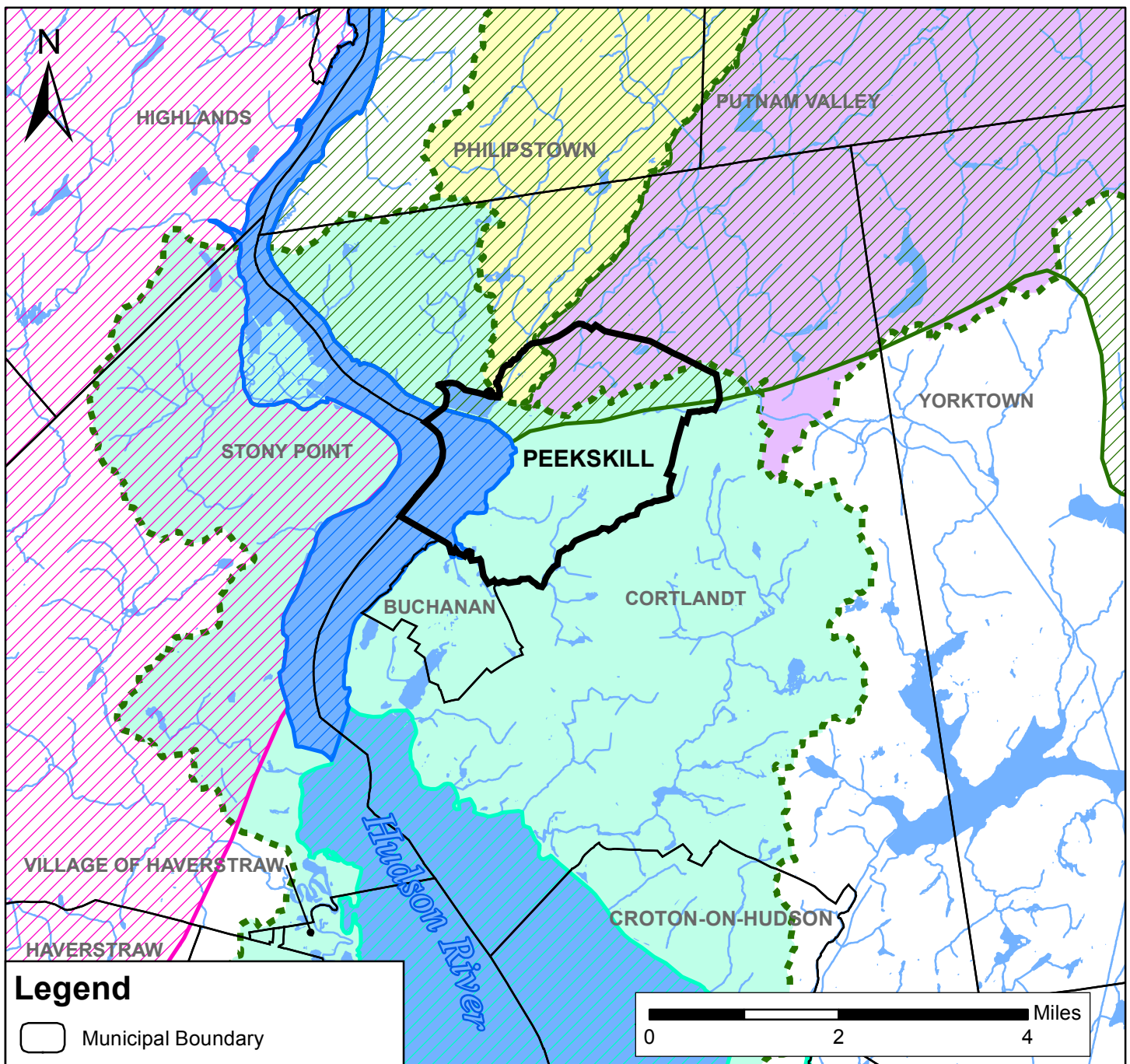
NYNHP has records of the federally-threatened [northern long-eared bat](#) and [little brown bat](#), a NY species of special concern, within the boundaries of the City. Peekskill's forests and street trees can provide summer roosting and foraging habitat for these and many other bat species, many of which are experiencing declines due to white-nose syndrome.

Shrublands, and Young Forests (not mapped)

Recently disturbed sites, such as hayfields, abandoned farm fields, or forest clearings, can provide important habitat for species that require grasslands, shrublands, and young forests. These successional habitat types are transitional and relatively short-lived, and typically require periodic maintenance to avoid becoming more densely vegetated, eventually developing a canopy and becoming forest. We can infer from breeding bird records that valuable young forests and shrublands occur near Peekskill (see [Table 1](#)).

Shrublands and young forests are transitional habitats characterized by few or no mature trees, with a diverse mix of shrubs and/or tree saplings, along with openings where grasses and wildflowers grow. They can occur in recently cleared areas and abandoned farmland and are sometimes maintained along utility corridors by cutting or herbicides. These habitats are important for many wildlife species declining throughout the region because former agricultural areas have grown into forests, and natural forest disturbances that trigger young forest growth, such as fires, have been suppressed. The [NYS Breeding Bird Atlas](#) documented fourteen species of conservation concern in the Peekskill area that prefer young forest and shrubland habitat, including yellow-breasted chat, brown thrasher, and blue-winged warbler. For more information, see Audubon's guidance on [managing habitat for shrubland and young forest birds](#).

Figure 1: Regional Context of the City of Peekskill



Legend

- Municipal Boundary
- Stream
- Waterbody

Significant Biodiversity Areas

- Hudson Highlands East
- Hudson Highlands West
- Lower Hudson River
- Mid Hudson River

Watershed

- Annsville Creek
- Direct Hudson River drainage
- Peekskill Hollow Creek

This map shows the location of the City of Peekskill, Westchester County, NY in relation to its major watersheds and significant biodiversity areas. This map was produced as part of a habitat summary for the city. For more information, please contact NYSDEC's Hudson River Estuary Program Conservation and Land Use Specialist Nate Nardi-Cyrus at (845)256-3062 or at nate.nardi-cyrus@dec.ny.gov. <http://www.dec.ny.gov/lands/5094.html>
Data also available for interactive viewing at www.dec.ny.gov/lands/112137.html

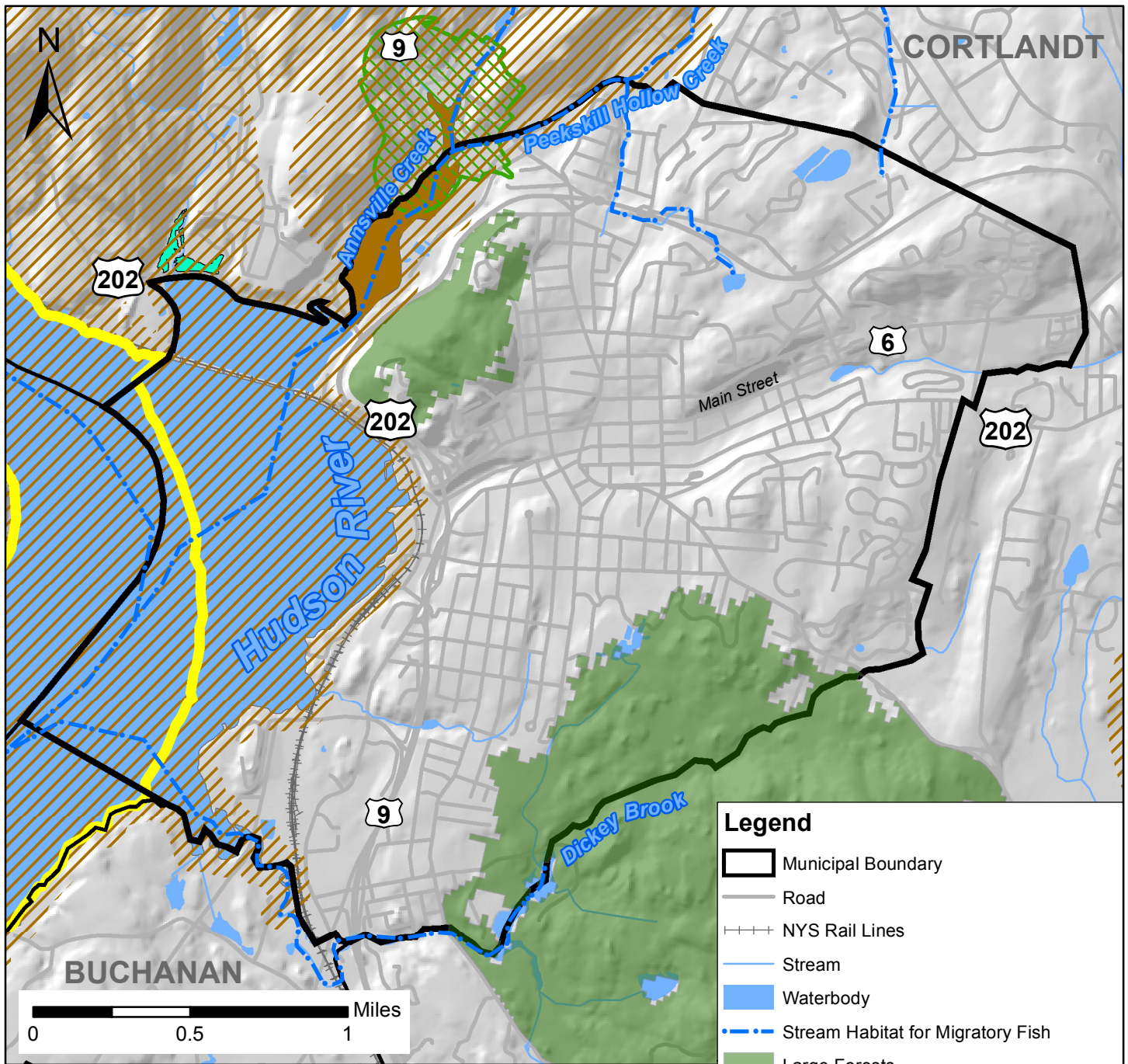
Data Sources:

NYS Office of Information Technology Services: municipal boundaries (2018) - NYSDEC: NHD streams and waterbodies (2008) & significant biodiversity areas (2006) - USDA Natural Resources Conservation Service: watersheds (2009). Map created 2018.



Cornell University

Figure 2: Significant Ecological Features in the City of Peekskill



This map shows the most important known ecological features in the City of Peekskill, Westchester County, based on limited information. This map was produced as part of a habitat summary for the city. For more information, please contact NYSDEC's Hudson River Estuary Program Conservation and Land Use Specialist Nate Nardi-Cyrus at (845)256-3026 or at nate.nardi-cyrus@dec.ny.gov. <http://www.dec.ny.gov/lands/5094.html>

Data also available for interactive viewing at www.dec.ny.gov/lands/112137.html

Data Sources:

NYS Department of State: Significant Coastal Fish and Wildlife Habitats (2012), New York Natural Heritage Program (NYNHP): Known Important Areas (2013), Stream habitat for migratory fishes (2011), Significant natural communities (2014), NYSDEC: National Hydrography Dataset streams and waterbodies (2017) NYS Office of Information Technology Services: roads, railroads, and municipal boundaries (2018), Cornell Department of Natural Resources: forest blocks (2015 - based on 2010 NOAA CCAP land cover). Map created 2018.

Legend

- Municipal Boundary
- Road
- NYS Rail Lines
- Stream
- Waterbody
- Stream Habitat for Migratory Fish
- Large Forests
- Significant Coastal Fish & Wildlife Habitat

Known important areas for:

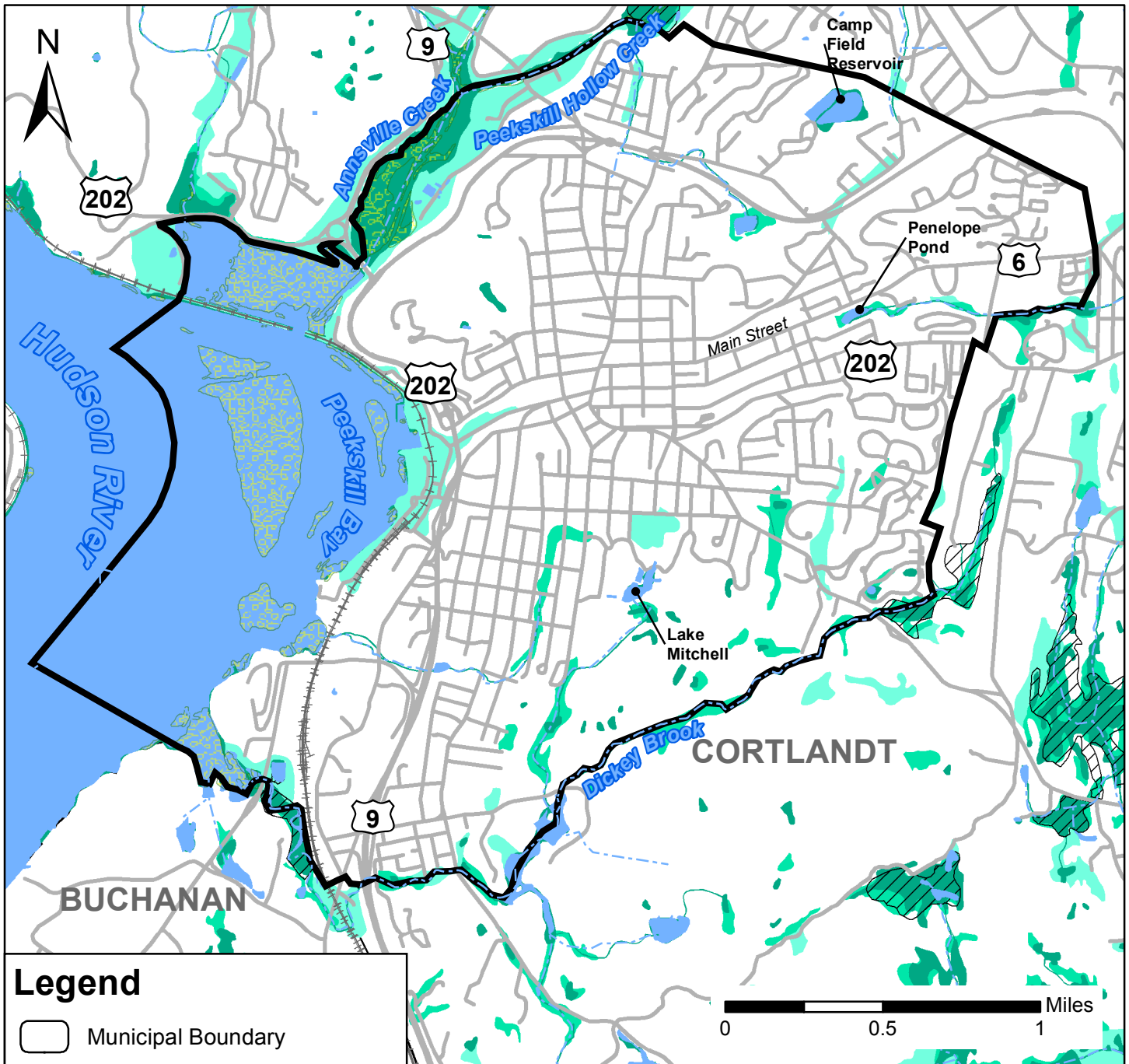
- Rare Animals
- Rare Plants

Significant natural communities:











- Brackish intertidal mudflats
- Brackish tidal marsh



Figure 3: Wetlands in the City of Peekskill



Legend

-  Municipal Boundary
-  Road
-  NYS Rail Lines
-  Stream
-  Waterbody
-  Submerged Aquatic Vegetation
-  NYSDEC Freshwater Wetland
-  Known wetland (NWI)
-  Probable wetland areas
-  Possible wetland areas

This map shows known wetlands from the National Wetlands Inventory (NWI), NYSDEC Freshwater Wetland Map, HRNERR submerged aquatic vegetation, as well as potential wetlands in the City of Peekskill, Westchester County, NY. Probable and possible wetland areas were identified based on soil drainage class in the Westchester County Soil Survey; see habitat summary text for more details. This map was produced as part of a habitat summary for the city. For more information, please contact NYSDEC's Hudson River Estuary Program Conservation and Land Use Specialist Nate Nardi-Cyrus at (845)256-3026 or at nate.nardi-cyrus@dec.ny.gov. <http://www.dec.ny.gov/lands/5094.html> Data also available for interactive viewing at www.dec.ny.gov/lands/112137.html

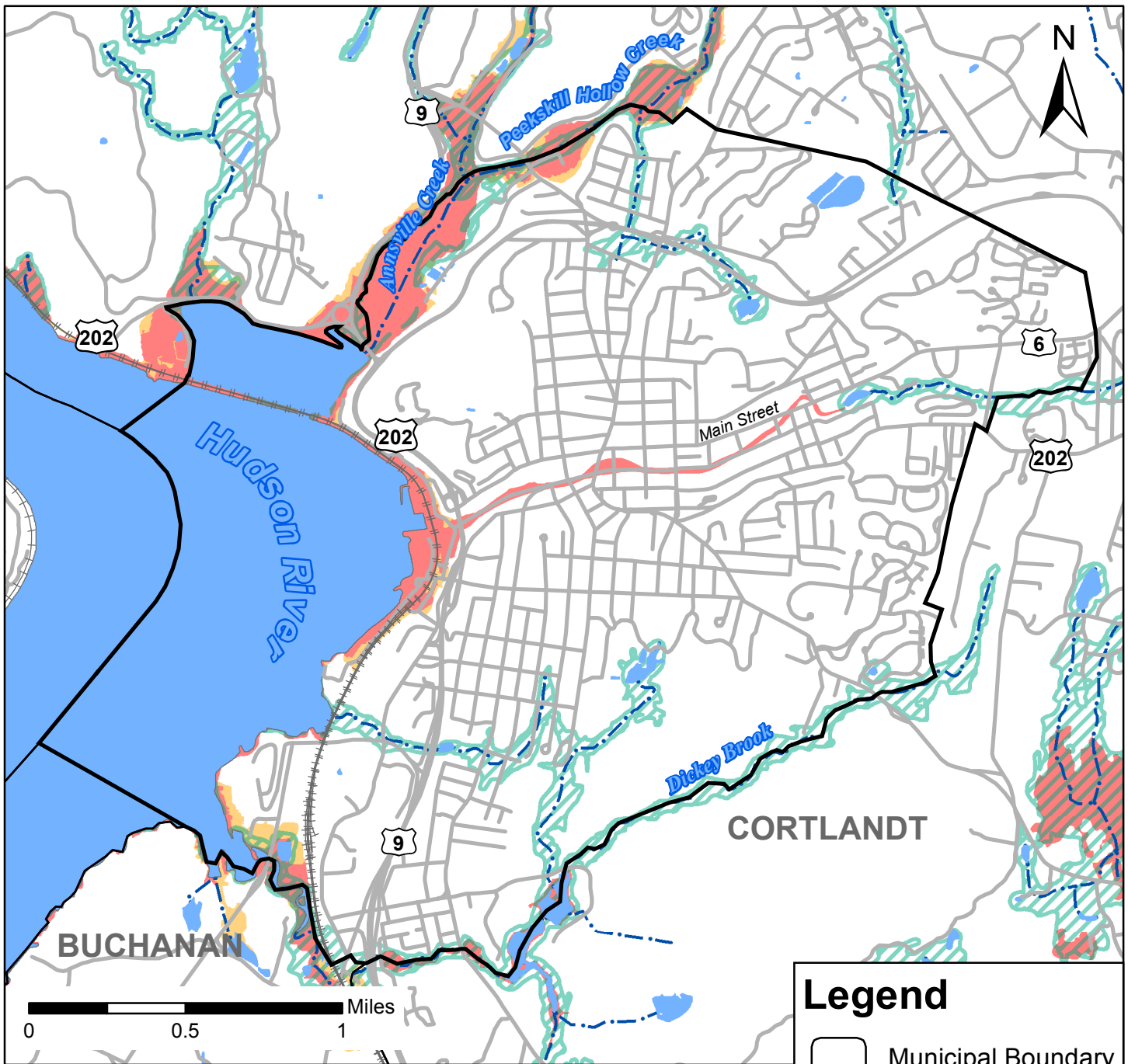
Data Sources:

NYS Office of Information Technology Services: roads, railroads, and municipal boundaries (2018). - NYSDEC: NHD streams and waterbodies (2008) - US Fish and Wildlife Service: National Wetlands Inventory (2016) - Natural Resource Conservation Service: Westchester County soil maps (current) - Hudson River Estuarine Research Reserve: submerged aquatic vegetation (2017). Map created 2018.



Cornell University

Figure 4: Streams and Floodplains in the City of Peekskill



This map shows streams, flood hazard areas, riparian buffers, waterbodies, and shoreline types in the City of Peekskill, Westchester County. This map was produced as part of a habitat summary for the city and is not intended for regulatory purposes. For more information, please contact NYSDEC's Hudson River Estuary Program Conservation and Land Use Specialist Nate Nardi-Cyrus at (845)256-3062 or nate.nardi-cyrus@dec.ny.gov. <http://www.dec.ny.gov/lands/5094.html>
 Data also available for interactive viewing at www.dec.ny.gov/lands/112137.html

Data Sources:

NYSDEC and USGS: NHD streams waterbodies (2008), New York Natural Heritage Program: riparian buffers (2018), Federal Emergency Management Agency: flood hazard zones (2016), NYS Office of Information Technology Services: roads, railroads, and municipal boundaries (2018). Map created 2018.

Legend

- Municipal Boundary
- NYS Rail Lines
- Road
- Waterbody
- Stream
- Riparian Buffers

Flood Hazard Areas

- 1% (100 year)
- 0.2% (500 year)

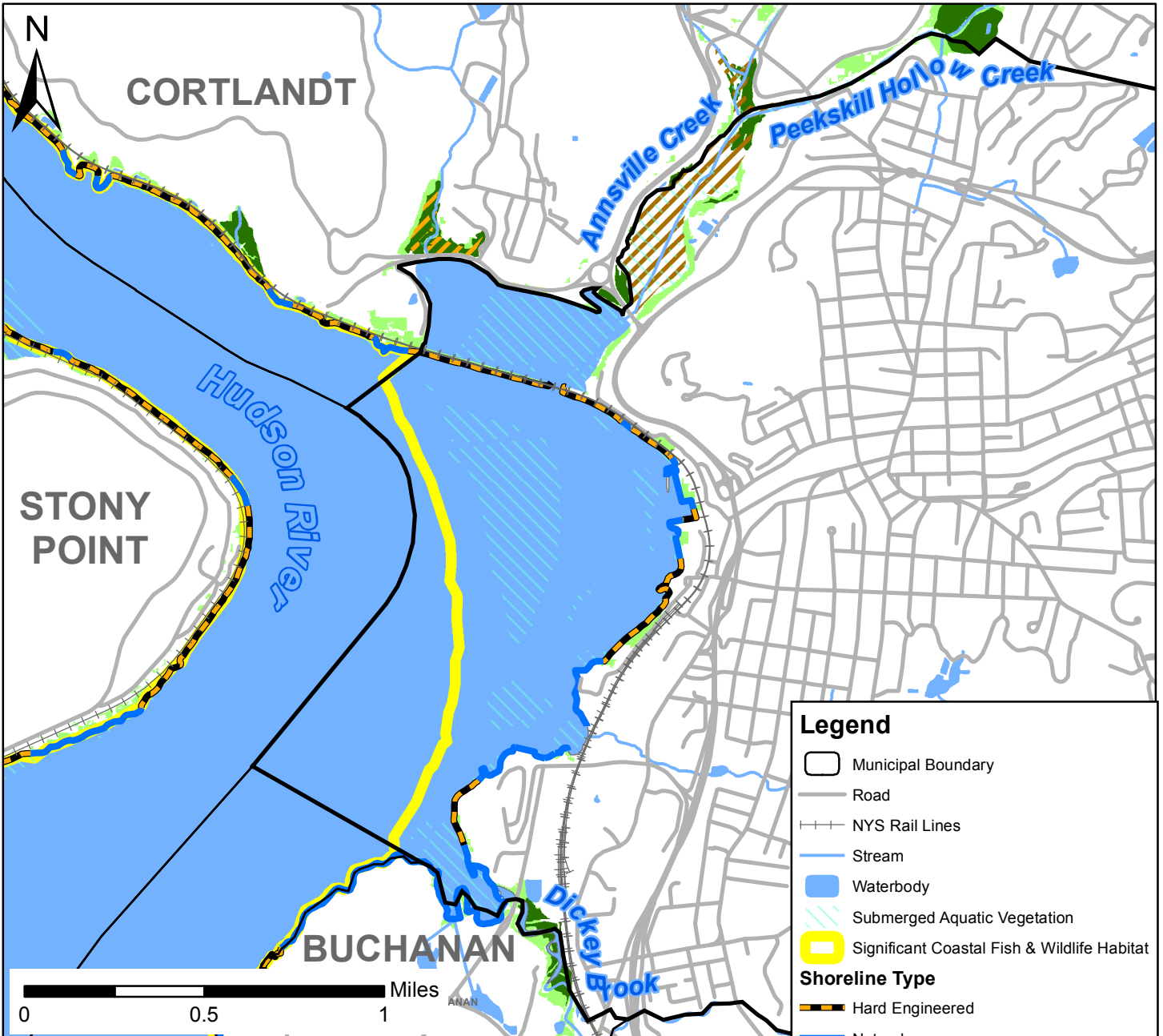


Department of Environmental Conservation



Cornell University

Figure 5: Hudson River Coastal Habitats in the City of Peekskill



This map shows Hudson River coastal habitats and general shoreline type in the City of Peekskill, Westchester County. It is based on existing information about significant ecosystems and vegetated shallows. Potential tidal wetland pathways show areas along the Hudson, and its tributaries, where tidal wetlands may move by 2100 as sea level rises based on a study by Scenic Hudson. This map was produced as part of a habitat summary for the city and is not intended for regulatory purposes. For more information, please contact NYSDEC's Hudson River Estuary Program Conservation and Land Use Specialist Nate Nardi-Cyrus at (845)256-3062 or nate.nardi-cyrus@dec.ny.gov. <http://www.dec.ny.gov/lands/5094.html>

Data also available for interactive viewing at www.dec.ny.gov/lands/112137.html

Data Sources:

Hudson River National Estuarine Research Reserve and NYSDEC: tidal wetlands (2011), general shoreline type (2005), and documented SAV (2014), NYS Department of State: significant coastal fish and wildlife habitats (2012), Scenic Hudson: potential future tidal wetlands (2015), NYSDEC and USGS: NHD streams waterbodies (2008), NYS Office of InformationTechnology Services: roads, railroads, and municipal boundaries (2018). Map created 2018.

Legend

- Municipal Boundary
- Road
- NYS Rail Lines
- Stream
- Waterbody
- Submerged Aquatic Vegetation
- Significant Coastal Fish & Wildlife Habitat

Shoreline Type

- Hard Engineered
- Natural

Significant natural communities

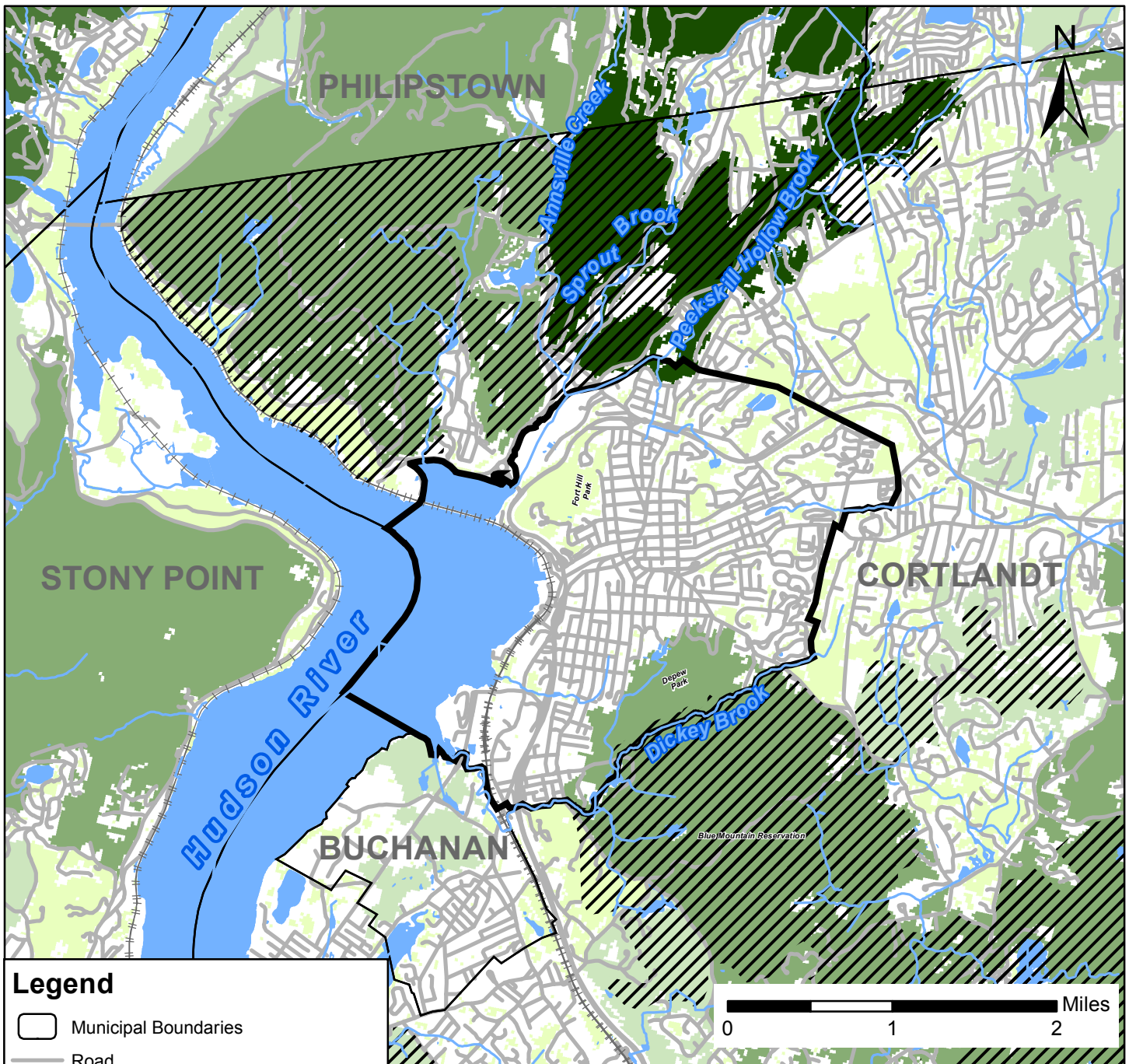
- Brackish intertidal mudflats
- Brackish tidal marsh

Tidal Wetlands

- Tidal Wetlands
- Potential Tidal Wetland Pathways



Figure 6: Forests in the City of Peekskill



Legend

- Municipal Boundaries
- Road
- NYS Rail Lines
- Stream
- Waterbody
- Croton-to-Highlands Biodiversity Areas

Forest Block Size (acres)

- Globally Important ($\geq 15,000$)
- Regionally Important (6,000-14,999)
- Locally Important (2,000-5,999)
- Stepping Stone (200-1,999)
- (0-199)

This map shows contiguous forested blocks of New York State by acreage for the City of Peekskill, Westchester County. The blocks were developed using 2010 forest cover data from the NOAA Coastal Change Analysis Program and buffered roads. This map was produced as part of a habitat summary for the city. For more information, please contact NYSDEC's Hudson River Estuary Program Conservation and Land Use Specialist Nate Nardi-Cyrus at (845)256-3062 or nate.nardi-cyrus@dec.ny.gov. <http://www.dec.ny.gov/lands/5094.html>
Data also available for interactive viewing at www.dec.ny.gov/lands/112137.html

Data Sources:

Cornell Department of Natural Resources: forest blocks (2015 - based on 2010 NOAA CCAP land cover), NYSDEC: NHD streams and waterbodies (2008), Metropolitan Conservation Alliance: Croton-to-Highlands Biodiversity Areas, NYS Office of Information Technology Services: roads, railroads, and municipal boundaries (2018). Map created 2018.



Cornell University

Table 1. Species and Habitats of Conservation Concern in the City of Peekskill, NY

The following table lists species and habitats of conservation concern that have been observed in the City of Peekskill and some adjacent areas. The information comes from the New York Natural Heritage Program (NYNHP) biodiversity databases, the 2000-2005 New York State Breeding Bird Atlas (NYBBA), and the New York State Education Department (NYSED) Fish Atlas. Species from the NYBBA are included in the table if they were documented in Atlas blocks spanning the City's major natural areas (i.e. The Hudson River, Annsville Creek, Peekskill Hollow Creek, Depew Park). Note that NYBBA blocks include records from areas outside of the City. The table only includes species listed in New York as endangered, threatened, special concern, or Species of Greatest Conservation Need (SGCN), or a [Hudson River Valley Priority Bird](#) species recognized by Audubon New York. Generalized primary habitat types are provided for each species, but for conservation and planning purposes, it's important to recognize that many species utilize more than one kind of habitat. More information on rare animals, plants, and ecological communities can be found at <http://guides.nynhp.org>. This table was provided by request to the City of Peekskill in October 2018 by the DEC Hudson River Estuary Program to inform land-use planning and decision-making.

Common Name	Scientific Name	General Habitat	NYS Conservation Status					Data Source
			Hudson River Valley Priority Bird	Species of Greatest Conservation Need xx = high priority	Special Concern	Threatened	Endangered	
Mammals								
Little Brown Bat	<i>Myotis lucifugus</i>	cave, forest, wetland		xx				NYNHP
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	cave, forest		xx		US NY		NYNHP
Birds								
American Black Duck	<i>Anas rubripes</i>	wetland	x	xx				NYBBA
American Goldfinch	<i>Spinus tristis</i>	young forest, shrubland	x					NYBBA
American Kestrel	<i>Falco sparverius</i>	meadow	x	x				NYBBA
American Redstart	<i>Setophaga ruticilla</i>	forest	x					NYBBA
American Woodcock	<i>Scolopax minor</i>	young forest, shrubland	x	x				NYBBA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	lake, stream, forest	x	x		NY		NYNHP
Baltimore Oriole	<i>Icterus galbula</i>	forest	x					NYBBA
Belted Kingfisher	<i>Megaceryle alcyon</i>	lake, stream	x					NYBBA
Black-and-white Warbler	<i>Mniotilta varia</i>	forest	x					NYBBA
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	young forest, shrubland	x	x				NYBBA

Common Name	Scientific Name	General Habitat	NYS Conservation Status					Data Source
			Hudson River Valley Priority Bird	Species of Greatest Conservation Need xx = high priority	Special Concern	Threatened	Endangered	
Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	wetland	x	x				NYBBA
Blue-Winged Warbler	<i>Vermivora pinus</i>	young forest, shrubland	x	x				NYBBA
Broad-winged Hawk	<i>Buteo platypterus</i>	forest	x					NYBBA
Brown Thrasher	<i>Toxostoma rufum</i>	young forest, shrubland	x	xx				NYBBA
Cerulean Warbler	<i>Dendroica cerulea</i>	forest	x	x	x			NYBBA
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	young forest, shrubland	x					NYBBA
Chimney Swift	<i>Chaetura pelagica</i>	urban	x					NYBBA
Cooper's Hawk	<i>Accipiter cooperii</i>	forest	x		x			NYBBA
Downy Woodpecker	<i>Picoides pubescens</i>	forest	x					NYBBA
Eastern Kingbird	<i>Tyrannus tyrannus</i>	young forest, shrubland	x					NYBBA
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	young forest, shrubland	x					NYBBA
Eastern Wood-Pewee	<i>Contopus virens</i>	forest	x					NYBBA
Field Sparrow	<i>Spizella pusilla</i>	young forest, shrubland	x					NYBBA
Hooded Warbler	<i>Wilsonia citrina</i>	forest	x					NYBBA
Least Bittern	<i>Ixobrychus exilis</i>	wetland	x	x		NY		NYBBA
Louisiana Waterthrush	<i>Seiurus motacilla</i>	forest	x	x				NYBBA
Marsh Wren	<i>Cistothorus palustris</i>	wetland	x					NYBBA
Northern Flicker	<i>Colaptes auratus</i>	forest	x					NYBBA
Osprey	<i>Pandion haliaetus</i>	open water, wetland	x		x			NYBBA
Peregrine Falcon	<i>Falco peregrinus</i>	cliff	x	x			NY	NYBBA
Prairie Warbler	<i>Dendroica discolor</i>	young forest, shrubland	x	x				NYBBA
Red-shouldered Hawk	<i>Buteo lineatus</i>	forest	x	x	x			NYBBA
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	forest	x					NYBBA
Ruffed Grouse	<i>Bonasa umbellus</i>	young forest, shrubland	x	x				NYBBA
Scarlet Tanager	<i>Piranga olivacea</i>	forest	x	x				NYBBA

Common Name	Scientific Name	General Habitat	NYS Conservation Status					Data Source
			Hudson River Valley Priority Bird	Species of Greatest Conservation Need xx = high priority	Special Concern	Threatened	Endangered	
Sora	<i>Porzana carolina</i>	wetland	x					NYBBA
Willow Flycatcher	<i>Empidonax traillii</i>	young forest, shrubland	x					NYBBA
Wood Thrush	<i>Hylocichla mustelina</i>	forest	x	x				NYBBA
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	forest	x	x				NYBBA
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	young forest, shrubland	x					NYBBA
Yellow-breasted Chat	<i>Icteria virens</i>	young forest, shrubland	x	xx	x			NYBBA
Yellow-throated Vireo	<i>Vireo flavifrons</i>	forest	x					NYBBA
Amphibians								
Marbled Salamander	<i>Ambystoma opacum</i>	vernal pool, forest		x	x			NYARA
Fish								
Alewife	<i>Alosa pseudoharengus</i>	coast, stream		x				NYSED
American Eel	<i>Anguilla rostrata</i>	coast, stream		xx				NYSED
American Shad	<i>Alosa sapidissima</i>	coast, stream		xx				NYSED
Atlantic Needlefish	<i>Strongylura marina</i>	coast						NYNHP
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	coast		xx			US	NYNHP
Bay Anchovy	<i>Anchoa mitchilli</i>	coast		x				NYSED
Blueback Herring	<i>Alosa aestivalis</i>	coast, stream		x				NYSED
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	coast		x			US NY	NYNHP
Plants								
Spongy Arrowhead	<i>Sagittaria montevidensis</i> ssp. <i>spongiosa</i>	coast					NY	NYNHP
Natural Communities								
Brackish Intertidal Mudflats								NYNHP
Brackish Tidal Marsh								NYNHP
Historical Records								
Downy Wood-mint	<i>Blephilia ciliata</i>	forest, rocky summit					NY	NYNHP
Globe-fruited Ludwigia	<i>Podilymbus podiceps</i>	wetland					NY	NYNHP

Common Name	Scientific Name	General Habitat	NYS Conservation Status					Data Source
			<u>Hudson River Valley Priority Bird</u>	<u>Species of Greatest Conservation Need</u> xx = high priority	<u>Special Concern</u>	<u>Threatened</u>	<u>Endangered</u>	
Hooker's Orchid	<i>Platanthera hookeri</i>	forest					NY	NYNHP
Puttyroot	<i>Aplectrum hyemale</i>	forest					NY	NYNHP

This document was created by the New York State Department of Environmental Conservation's Hudson River Estuary Program and Cornell University's Department of Natural Resources with funding from the NYS Environmental Protection Fund.

CONTACT INFORMATION

Nate Nardi-Cyrus

Hudson River Estuary Conservation and Land Use Specialist

New York State Department of Environmental Conservation

21 South Putt Corners Road, New Paltz, NY 12561

845-256-3062 | nate.nardi-cyrus@dec.ny.gov

www.dec.ny.gov/lands/5094.html

References

- Abood, S., A. Maclean, and L. Mason. 2012. Modeling Riparian Zones Utilizing DEMS and Flood Height Data. *Photogrammetric Engineering & Remote Sensing* 78:259–269.
- Audubon NY. 2009. Bird Conservation in the Hudson River Valley [website]. Retrieved from <http://ny.audubon.org/hudson-river-valley-conservation> in December 2013. Ithaca, NY.
- Calhoun, A. and M. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York. 57 pp. <http://maineaudubon.org/wp-content/uploads/2012/08/Best-Development-Practices-Conserving-Pool-breeding-Amph.pdf>
- Conley, A., T. Howard, and E. White. 2018. New York State Riparian Opportunity Assessment. New York Natural Heritage Program, State University of New York College of Environmental Science and Forestry, Albany, NY. Available at http://nynhp.org/files/TreesForTribes2017/Statewide_riparian_assessment_final_jan2018.pdf
- Environmental Law Institute. 2008. Planner's Guide to Wetland Buffers for Local Governments. Washington, D.C. 25 pp. www.eli.org/sites/default/files/eli-pubs/d18_01.pdf
- Haeckel, I. and L. Heady. 2014. Creating a Natural Resources Inventory: A Guide for Communities in the Hudson River Estuary Watershed. Department of Natural Resources, Cornell University, and New York State Department of Environmental Conservation, Hudson River Estuary Program. Ithaca, N.Y. 102 pp. www.dec.ny.gov/lands/100925.html
- Huffman & Associates, Inc. 2000. Wetlands Status and Trend Analysis of New York State - Mid-1980's to Mid-1990's. Prepared for New York State Department of Environmental Conservation. Larkspur, California. 17pp. plus attachments. http://www.dec.ny.gov/docs/wildlife_pdf/wetstattrend2.pdf
- Kiviat, E. and G. Stevens. 2001. Biodiversity Assessment Manual for the Hudson River Estuary Corridor. NYS Department of Environmental Conservation, Albany, NY. 507 pp.
- Knab-Vispo, C. and C. Vispo. 2010. Floodplain Forests of Columbia and Dutchess Counties, NY: Distribution, Biodiversity, Classification, and Conservation. Farmscape Ecology Program, Hawthorne Valley Farm. Ghent, NY. 90 pp. http://hvfarmscape.org/sites/default/files/fep_floodplain_forest_report_nov_2010.pdf
- Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D. P. Guertin, M. Tluczek, and W. Kepner. 2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046. Available at https://www.epa.gov/sites/production/files/2015-03/documents/ephemeral_streams_report_final_508-kepner.pdf
- Miller, N. and M. Klemens. 2004. Croton-to-Highlands Biodiversity Plan: Balancing development and the environment in the Hudson River Estuary Catchment. MCA Technical Paper No. 7, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, NY. 34 p. http://www.yorktownny.org/sites/default/files/fileattachments/planning/page/212/chbp_lo-res1.pdf
- Morgan, D. and A. Calhoun. 2012. The Maine Municipal Guide to Mapping and Conserving Vernal Pools. University of Maine, Sustainability Solutions Initiative, Orono, ME. <http://maineaudubon.org/wp-content/uploads/2012/08/MeAud-ME-Municipal-Guide-to-Mapping-and-Conserving-Vernal-Pool.pdf>
- National Audubon Society. 2013. Important Bird Areas in the US. <http://www.audubon.org/bird/iba>. (accessed July 2015).
- New York Amphibian and Reptile Atlas. 1990-1999. Albany (New York): New York State Department of Environmental Conservation. Website: <http://www.dec.ny.gov/animals/7140.html> accessed July 2015).

New York State Breeding Bird Atlas 2000 [Internet]. 2000 - 2005. Release 1.0. Albany (New York): New York State Department of Environmental Conservation. [updated 2007 Jun 11; data retrieved July 2015]. Available from: <http://www.dec.ny.gov/animals/7312.html>

New York State Wildlife Action Plan. 2015. New York State Department of Environmental Conservation, Albany, NY. Available at <http://www.dec.ny.gov/animals/7179.html>

New York State Department of Environmental Conservation and New York Cooperative Fish and Wildlife Research Unit at Cornell University. 2015. Species of Greatest Conservation Need List. Available at http://www.dec.ny.gov/docs/wildlife_pdf/sgnc2015list.pdf

New York Natural Heritage Program, New York State Department of Environmental Conservation. [cited July 2015]. Biodiversity Databases, Element Occurrence Record Digital Data Set. Albany, New York. www.nynhp.org

New York Natural Heritage Program, New York State Department of Environmental Conservation. Biodiversity Databases, Important Areas Digital Data Set [updated 25 April 2013]. Albany, New York. www.nynhp.org

National Oceanic and Atmospheric Administration. 2010. Land Cover data for the Coastal Change Analysis Program. NOAA Coastal Service Center. Charleston, SC. <https://coast.noaa.gov/dataregistry/search/collection/info/ccapregional>

Orange County (N.Y.) Planning Department. 2004. Orange County Open Space Plan. Goshen, N.Y. http://www.orangecountygov.com/filestorage/124/1362/1460/10182/Supplement_1_Open_Space_Plan.pdf

Penhollow, M., P. Jensen, and L. Zucker. 2006. Wildlife and Habitat Conservation Framework: An Approach for Conserving Biodiversity in the Hudson River Estuary Corridor. New York Cooperative Fish and Wildlife Research Unit, Cornell University and New York State Department of Environmental Conservation, Hudson River Estuary Program, Ithaca, NY. 139 pp. <http://www.dec.ny.gov/lands/5096.html>

Strong, K. 2008. Conserving Natural Areas and Wildlife in Your Community: Smart Growth Strategies for Protecting the Biological Diversity of New York's Hudson River Valley. New York Cooperative Fish and Wildlife Research Unit, Cornell University, and New York State Department of Environmental Conservation, Hudson River Estuary Program. Ithaca, N.Y. <http://www.dec.ny.gov/lands/50083.html>

White, E.L., J.J. Schmid, T.G. Howard, M.D. Schlesinger, and A.L. Feldmann. 2011. New York State freshwater conservation blueprint project, phases I and II: Freshwater systems, species, and viability metrics. New York Natural Heritage Program, The Nature Conservancy. Albany, NY. 85 pp. plus appendix. http://nynhp.org/files/FreshwaterBlueprint2011/NYS_Freshwater_Blueprint_30Dec2011.pdf

Zucker, L. and L. Lau. 2009. An analysis of the size and distribution of geographically isolated, small wetlands in the Hudson River estuary watershed. Cornell University, Ithaca, NY. Unpublished report.

General Conservation Measures for Protecting Natural Areas and Wildlife



Hudsonia Ltd.

- **Protect large, contiguous, unaltered tracts** wherever possible.
- **Preserve links** between natural habitats on adjacent properties.
- **Preserve natural disturbance processes**, such as fires, floods, tidal flushing, seasonal drawdowns, landslides, and wind exposures wherever possible. Discourage development that would interfere with these processes.
- **Restore and maintain broad buffer zones** of natural vegetation along streams, along shores of other water bodies and wetlands, and at the perimeter of other sensitive habitats.
- In general, **encourage development of altered land** instead of unaltered land wherever possible.
- **Promote redevelopment of brownfields**, other post-industrial sites, and other previously-altered sites (such as mined lands), “infill” development, and “adaptive re-use” of existing structures wherever possible, instead of breaking new ground in unaltered areas.
- **Encourage pedestrian-centered developments** that enhance existing neighborhoods, instead of isolated developments requiring new roads or expanded vehicle use.
- **Concentrate development along existing roads**; discourage construction of new roads in undeveloped areas. Promote clustered development wherever appropriate, to maximize extent of unaltered land.
- **Direct human uses toward the least sensitive areas**, and minimize alteration of natural features, including vegetation, soils, bedrock, and waterways.
- **Preserve farmland potential** wherever possible.
- **Minimize area of impervious surfaces** (roads, parking lots, sidewalks, driveways, roof surfaces) and maximize onsite runoff retention and infiltration to help protect groundwater recharge, and surface water quality and flows.
- **Restore degraded habitats wherever possible**, but do not use restoration projects as a “license” to destroy existing habitats.

Source: Kiviat, E. & G. Stevens. 2001. Biodiversity Assessment Manual for the Hudson River Estuary Corridor. NYS Department of Environmental Conservation, Albany, NY.