Chapter 4: Biological Communities and Habitats

Significant Habitats in the City of Poughkeepsie, Dutchess County, NY
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Summarized by Julia Blass and Jennifer Rubbo

Pollinator garden at College Hill Park.
Photo credit: Camelia Manring

Introduction

In May 2018, Hudsonia Ltd. compiled a Significant Habitats Report for the City of Poughkeepsie as part of the Natural Resources Inventory project funded by the Hudson River Estuary Program (Heffernan & Stevens, 2018). This report assessed the types of habitats present in the City and developed conservation priorities for the protection and restoration of the City's habitats. The report offers important information regarding habitats and the species that live in them in the urban environment. The Hudsonia report outlines the state of the City's habitats, and provides the foundational ecological information necessary for future decisions regarding the intersection of conservation, urban planning and development. The full report is available in Appendix A and it is highly recommended that the report be read in its entirety.

Poughkeepsie is a heavily urbanized area dominated by paved surfaces and the built environment; it is still home, however, to significant areas of habitat that play an important role in the ecological health of the City and the greater Hudson Valley Region. A **habitat** can be defined as "the place where an organism or population lives or where a biological

community occurs, and is defined according to both its biological and non-biological components."[1] Habitats include large, **ecologically significant areas** such as the Hudson River, the Fall Kill, and the Vassar Farm and Ecological Preserve. These are areas that include:

- "habitats that are rare or declining in the region, or those that support rare species and other species of other conservation concern;
- common habitats that meet a minimum size criterion for the habitat type;
- complexes of connected habitats that, by virtue of their size, composition, or configuration, appear to have significant biodiversity value."[2]

Other cultivated natural landscapes, such as College Hill Park and Springside, play important roles as habitats that preserve the biodiversity and ecological health of Poughkeepsie's communities. Preservation of the natural areas in the City of Poughkeepsie--from individual trees on the street to the larger tracts of natural land--is important for many reasons. Preserving the City's natural areas provides dual benefits for both Poughkeepsie's human and wildlife populations as these areas function in a variety of ways including: providing habitat, reducing stormwater runoff, mitigating the effects of climate change, providing shade and recreation areas, and beautifying the City.

Moving forward the Significant Habitats Report is a valuable resource to city planners, administration and residents and may be useful as the City:

- reviews a new comprehensive plan,
- approves proposed developments,
- improves its parks,
- and manages land use in the City of Poughkeepsie

Habitats in Poughkeepsie

Almost 20% of the 5.1 mi^2 (3258 ac) of terrestrial area of the City was mapped as ecologically significant habitat. If the Hudson River is included in this calculation, that percentage increases to 29.0% of the City.[3] The Hudsonia report identifies 18 habitat types of potential ecological significance and notes that each of these habitats have been modified by past or present human activities. The ecologically significant habitats located within the City of Poughkeepsie are categorized into three general categories: Upland Habitats, Non-Tidal Wetland Habitats, and Hudson River Habitats and further subdivided into specific habitat types (Map 4.1, Table 4.1). A complete description of the methods Hudsonia used to map habitats can be found in the full report.[4]

1 Hudsonia, 2018 p. 8.
2 Hudsonia, 2018 p. 8.
3 Hudsonia, 2018 p. 23.
4 Hudsonia, 2018 p. 17

Table 4.1 Ecologically significant habitats present in the City of Poughkeepsie, identified by Hudsonia, 2018.[5]

Habitat Category	Specific Habitat Type	Brief Description[6]
Upland Habitats	Upland Hardwood Forest	Non-wetland forest dominated by hardwood trees (conifers make up < 25% of canopy).
	Upland Conifer Forest	Non-wetland forest dominated by conifer trees (>75% of canopy).
	Upland Mixed Forest	Non-wetland forest with a mix of hardwoods and conifers (conifers make up 25-75% of canopy).
	Crest/Ledge	Upland area with shallow soil and partially exposed bedrock.
	Upland shrubland	Open (nonforested) area with shrubs making up > 20% of ground cover
	Cultural	Open area (may have scattered trees) mowed frequently or otherwise managed in an intensive way (lawn, playing field, golf course, garden, park, cemetery).
	Waste Ground	Land that has been severely altered by human activity but lacks pavement or structures. Gravel mines, quarries, dumps, wetland fill, abandoned lots, or construction sites. Places where soil has been removed, and sometimes replaced [like fill].
Non-Tidal Wetland Habitats	Hardwood and shrub swamp	Wetland (identified by predominance of hydrophytic vegetation) dominated by trees and/or shrubs.
	Intermittent woodland pool	Small wetland partially or fully surrounded by forest with no surface water inlet or outlet.
	Marsh	Wetland dominated by hydrophytic herbaceous vegetation that stays saturated/flooded most of the time.
	Wet meadow	Area of seasonally saturated or flooded soils dominated by hydrophytic herbaceous vegetation.
	Spring/seep	Location where groundwater discharges to ground surface

5 Hudsonia, 2018 p. 24.
6 Hudsonia, 2018, unpublished brief descriptions of habitats

	Constructed pond	Man-made body of water with a mostly managed shoreline (bordered by developed or cultural areas).
	Open water	Body of water (natural or manmade) with a mostly undeveloped shoreline.
	Stream	Intermittent stream – stream that has flow at least part of the year, including man-made ditches. Perennial stream – stream that generally flows year-round.
Hudson River Habitats	Riprap and native rocky shore	Manmade or naturally occurring rocky shore, sparse plant life and unknown faunal diversity
	Tidal tributary mouth	Area where mixing of tidal and non-tidal water occurs, where tributary and river meet.

Detailed descriptions of all habitat types, including their ecological attributes, the species that they could potentially support, and their conservation values can be found beginning on p.24 of Hudsonia's report. A list of species of conservation concern that have been documented in or near the City of Poughkeepsie is provided in Appendix F, (Species of Conservation Concern in the City of Poughkeepsie, NY). The largest habitat types in Poughkeepsie, which include the Hudson River, streams, upland hardwood forests, and cultural areas, are discussed below.

The Hudson River is the largest contiguous habitat in the City of Poughkeepsie and its most significant ecological resource. Poughkeepsie is located within the tidal portion of the Hudson River, known as an estuary. Though connected to the Atlantic Ocean by tides, the Hudson is entirely freshwater in Poughkeepsie, a globally-rare habitat. It is a designated NYSDEC Significant Biodiversity Area that supports many rare species as well as regionally important fisheries (Penhollow, Jensen, & Zucker, 2006). Poughkeepsie also lies within the Kingston-Poughkeepsie Deepwater Significant Coastal Fish and Wildlife Habitat as designated by the New York State Department of State (NYS Department of State). It is a well-known spawning area for the Atlantic sturgeon and overwintering grounds for the shortnose sturgeon, both of which are listed as federally endangered species (NYS Department of State, 2012). It is an important habitat for many other migratory and resident fish species including the American eel, American shad, blueback herring, striped bass, fourspine stickleback, hogchoker, and white perch (NYS Department of State, 2012). In addition to fish it provides habitat and food for many other organisms, such as blue crab, bald eagles, and a variety of waterfowl (NYS Department of State, 2012).

Seventy percent of the shoreline in Poughkeepsie is made up of rock riprap and native rock[7] (Map 4.2). These rocky areas are harsh environments since temperature fluctuates radically, they are temporarily inundated due to tides, ice scours the banks in the winter, and there is wind and wave disturbance. The largest threat to these areas is sea-level rise and more frequent flooding. Development of the shoreline should take into account these potential and predicted changes to the water levels at the shoreline (see Ch.7 for more information about Climate Change in Poughkeepsie). The Hudson River Sustainable Shorelines project is an effort through the Hudson River National Estuarine Research Reserve to disseminate and facilitate best practices for shoreline management in light of potential climate change impacts. More information about this project can be found at https://www.hrnerr.org/hudson-river-sustainable-shorelines

Streams in Poughkeepsie include both perennial streams, which have water year-round, and intermittent streams which only flow seasonally or after heavy rain (see Chapter 3. Water Resources). Streams provide important aquatic habitat for a variety of fish, invertebrates, amphibians and bird species. Equally important is the riparian area adjacent to the stream. Intact riparian areas are typically forested, providing shade to the stream as well as habitat to a host of both aquatic and terrestrial animal species. Two perennial streams located in the City of Poughkeepsie are major tributaries to the Hudson River: the Fall Kill on the north side, and the Casperkill, which flows along the southeastern border of the City. The Fall Kill is highly impacted by channelization and pollution, nonetheless it continues to serve as an important habitat for migratory fish species such as the American eel and river herring. The area along the Fall Kill, adjacent to the City Department of Public Works, is an important site when considering ecosystem services of the creek. The stream is not channelized in this area and there are intact areas of floodplain forest that provide important habitat and floodwater retention and storage (see Ch. 3 Water Resources).

The small portion of the mainstem of the Casperkill within the City is located on the Vassar Farm and Ecological Preserve. The Casperkill is exposed to high levels of non-point source pollution for much of its length; however, as it flows through the Vassar Preserve, water quality improves due to an intact riparian buffer. Biomonitoring studies have shown a change in benthic macroinvertebrate indicators from "poor" upstream of the Preserve to "very good" at sampling points on the Preserve (Menking, Cunningham, Foley, Freimuth, & Smith, 2009). Practices that will increase the quality of habitat within streams include: 1) reducing surface runoff into the stream; 3) decreasing impervious surfaces in the watershed; and 2) maintaining and restoring a vegetated riparian buffer that includes shade providing trees where possible. Historically, there were more streams in the City of Poughkeepsie which are now mapped as small stream fragments throughout the City. It is likely that these are now buried or piped and no longer provide the ecosystem services of a natural stream. (see Ch. 3 Water Resource for more information about buried streams in the City).

Upland Hardwood Forests comprise the most extensive terrestrial habitat type in the City of Poughkeepsie, with the largest habitat patches of forest found on the Vassar Farm and Ecological Preserve. Large mature trees also exist throughout the City in smaller remnants of forest, such as at College Hill Park and Springside. These patches of large mature trees potentially provide habitat for important small mammals such the federally endangered Indiana Bat (Appendix F) which has been observed in Poughkeepsie and its vicinity. Several priority bird species associated with larger forest habitats have been identified in or near

7 Hudsonia 2018 p. 61

Poughkeepsie and might use forest areas in the City, including Kentucky warbler, scarlet tanager, and wood thrush, among others (Appendix F). It is important to note that, while the Hudsonia maps only depict forest areas that are 0.2 acres or greater, street trees and backyard trees also contribute to the urban forest ecosystem. In addition to acting as refuge and food source for many species of birds, butterflies, and other insects, mature trees provide a multitude of services to people as well. These include cooling from shade, carbon sequestration, reducing stormwater runoff, and improvement of air quality. (Chapter 5 of the Natural Resources Inventory discusses the benefits of urban trees in more detail.)

Cultural areas are second largest habitat type in Poughkeepsie. These consist of areas that are actively managed yet not paved, such as mowed lawns, public parks, athletic fields and golf courses. Due to high levels of management these areas may not support a large diversity of plant and animals species. However, a few rare species that have adapted to urban areas occur in or near the City, including the state endangered peregrine falcon and state special concern common nighthawk (Appendix F). Additionally, cultural areas serve an important role in connecting more natural undeveloped habitats while offering open space for people, facilitating outdoor activities and engagement with nature in this otherwise paved and built landscape (See Chapter 6 Cultural, Recreational and Historic Resources).

Access to these public greenspaces is important when considering their benefit to the health of Poughkeepsie residents. Studies have shown the positive impacts of greenspaces and parks on both the mental and physical health of residents (Liu, Li, Li, & Zhang, 2017; Richardson, Pearce, Mitchell, & Kingham, 2013; Wood, Hooper, Foster, & Bull, 2017). Living close to (within 1/3 mile) parks or open spaces, especially those that allow interactions with nature, has been significantly associated with mental health benefits such as increased self-confidence and relaxation (Liu, Li, Li, & Zhang, 2017). Residents living within a 10-15 minute walk (1 mile) of a park or greenspace, whether nature focused, recreation, or athletic, had more positive states of mental well-being, with a corresponding increase in mental well-being as the number of and access to parks increased (Wood, Hooper, Foster, & Bull, 2017). Additionally, the risk of cardiovascular disease decreased in neighborhoods with >15% greenspace (Richardson, Pearce, Mitchell, & Kingham, 2013). Hudsonia's report identifies areas that are within walking distance (500m, 10-minute walk) of habitat areas located on public land (Map 4.3).[8] Several areas in the City have been identified as lacking in public greenspace, including the area near Main Street and Cannon Street and the south-central portion of the City.

8 Hudsonia, 2018 pg. 40

Map 4.1 Significant Habitat Areas in the City of Poughkeepsie

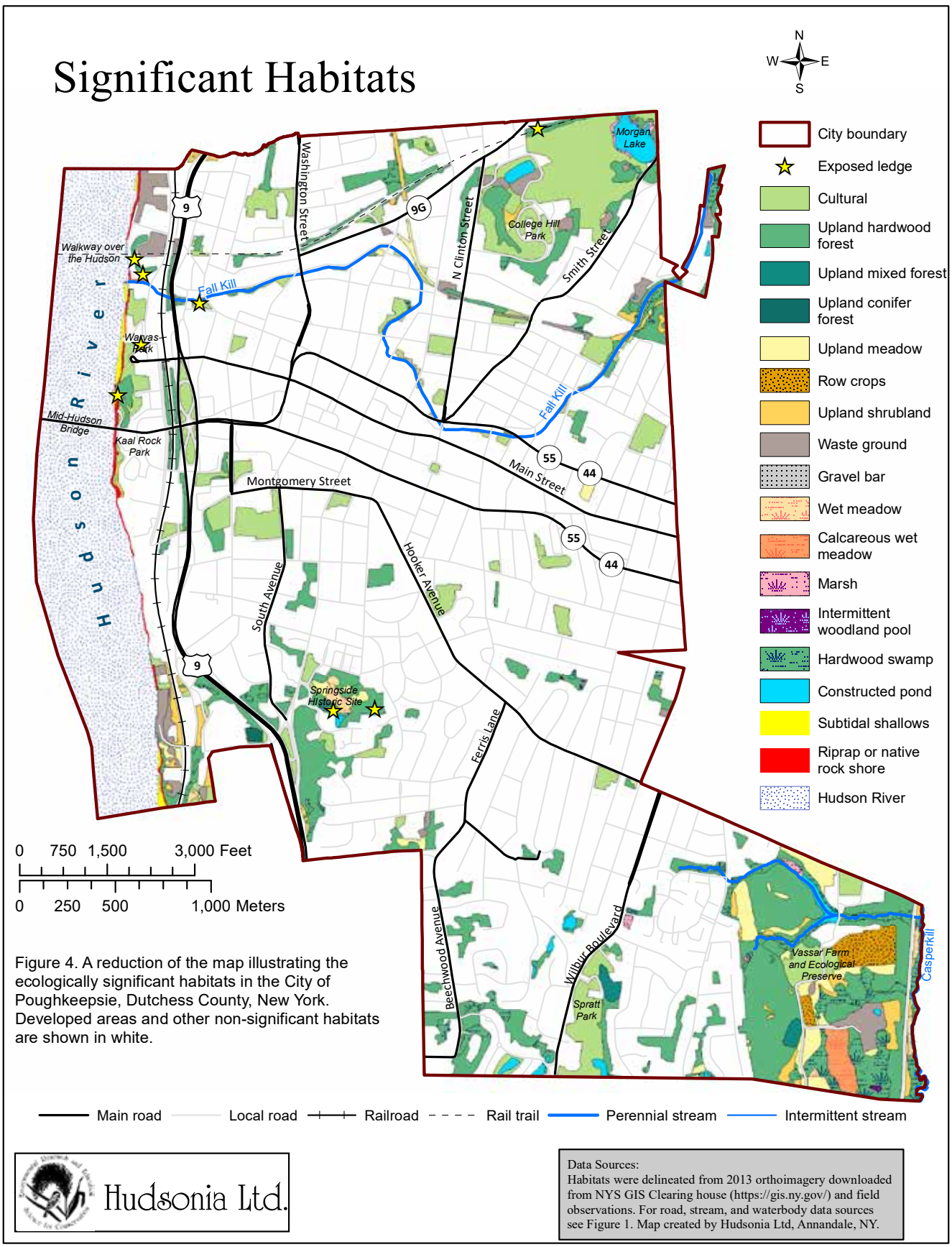

Figure 4. A reduction of the map illustrating the ecologically significant habitats in the City of Poughkeepsie, Dutchess County, New York. Developed areas and other non-significant habitats are shown in white.

Hudsonia Ltd.

Data Sources:
Habitats were delineated from 2013 orthoimagery downloaded from NYS GIS Clearing house (https://gis.ny.gov/) and field observations. For road, stream, and waterbody data sources see Figure 1. Map created by Hudsonia Ltd, Annandale, NY.

Map 4.2 Shoreline materials and models of the sea – level rise in the City of Poughkeepsie

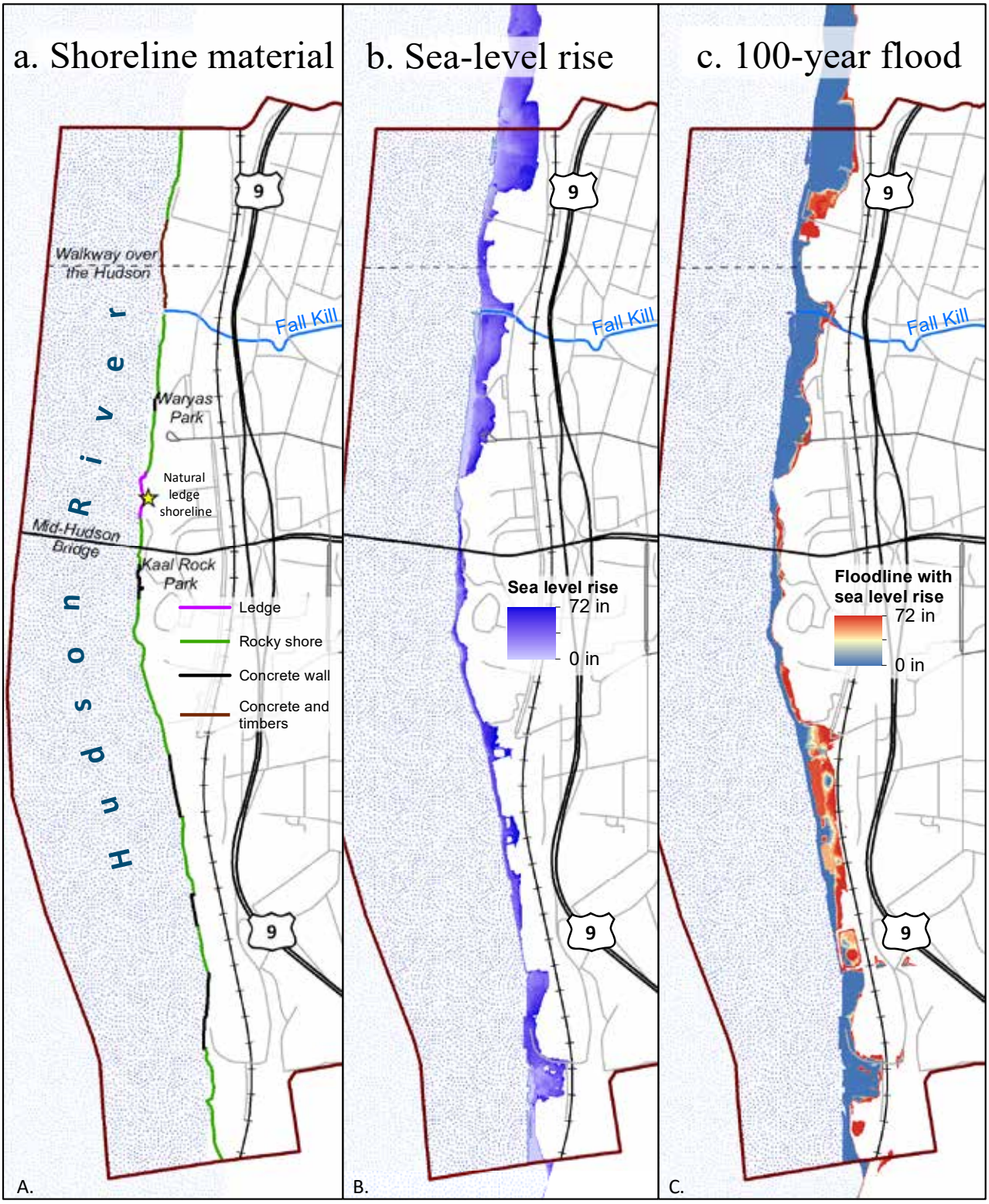

Figure 7. Shoreline material and models of sea level rise and floodlines through 2100 in the City of Poughkeepsie, Dutchess County, New York. "0 in" indicates present day sea levels and 100-year flood predictions.

Data Sources:
Sea level rise and flood model data from Scenic Hudson 2013 (https://www.scenichudson.org/slr/mapper). Shoreline material from Hudsonia field observations and 2013 orthoimagery. For road and stream data sources, see Figure 1. Map created by Hudsonia Ltd., Annandale, NY.

Map 4.3 Public Access Greenspaces in the City of Poughkeepsie

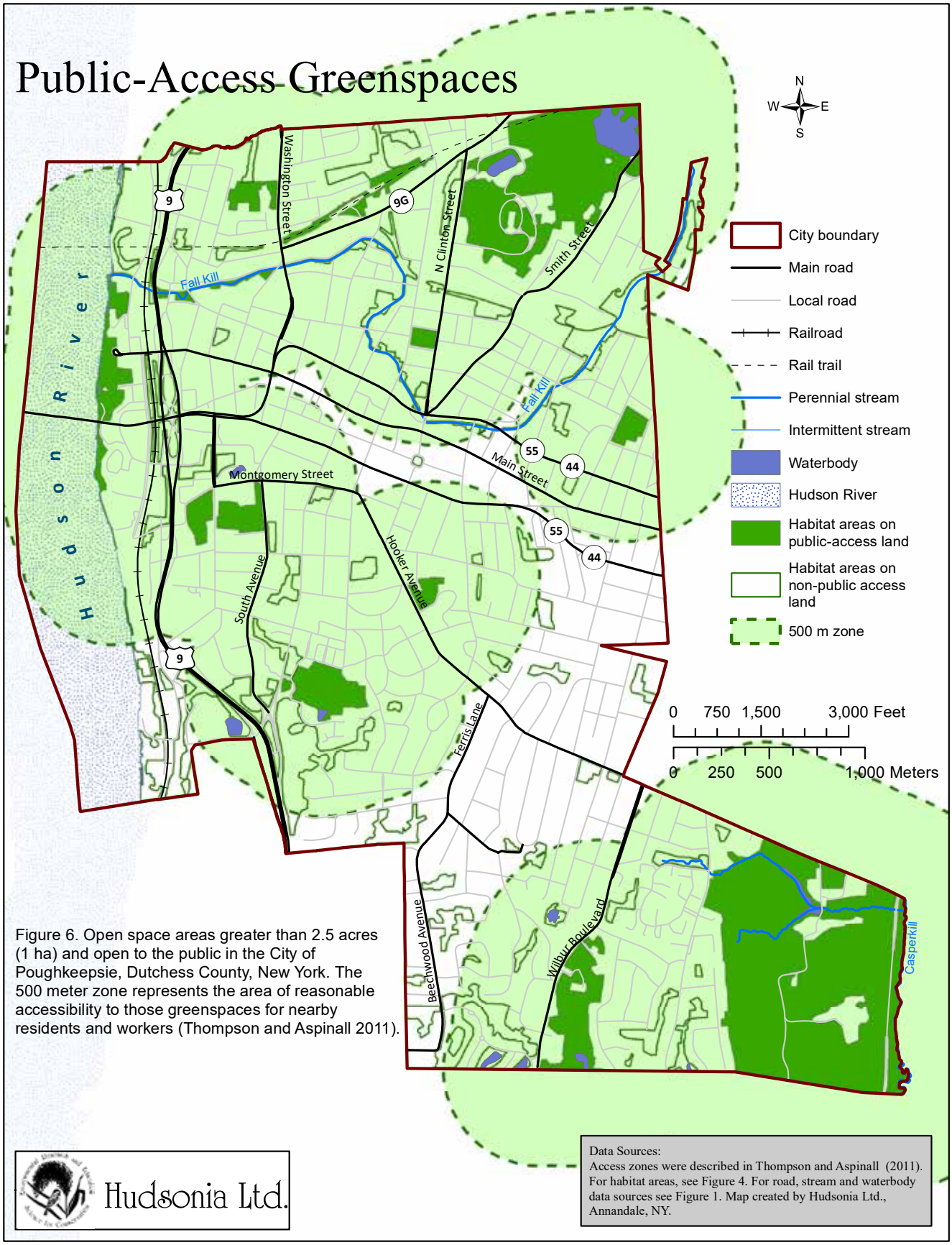

Figure 6. Open space areas greater than 2.5 acres (1 ha) and open to the public in the City of Poughkeepsie, Dutchess County, New York. The 500 meter zone represents the area of reasonable accessibility to those greenspaces for nearby residents and workers (Thompson and Aspinall 2011).

Conservation Priorities and Planning

The City of Poughkeepsie is a predominantly developed landscape. However, of the 3,258 terrestrial acres of the City, 658 acres (20.2%) of the landscape is undeveloped at present. This number represents the 162 acres (5%) of intensively managed parkland and recreation areas and the 496 acres (15.2%) of undeveloped areas that are considered ecologically significant habitat.98 These habitats are explained in Table 4.2 and include representative species that might occur in these habitats although have not necessarily been recorded in the City of Poughkeepsie. Hudsonia provides a detailed list of conservation strategies specific to each priority habitat, and these recommendations can be found beginning on p. 85 of the full report.

Table 4.2 Priority habitats and conservation zones in the City of Poughkeepsie identified by Hudsonia, 2018.[10]

Priority Habitat	Representative Species or Group of Concern	Priority Conservation Zone	Rationale
Large contiguous forest	Forest interior-breeding birds	Unfragmented areas with a high percentage of forest cover and/or wetland complexes	Maximizes the occurrence and breeding success of species.
Large meadow	Grassland-breeding birds	Unfragmented patches greater than 10 ac (4 ha)	Required for successful breeding and maintenance of viable populations.
Intermittent woodland pool	Pool-breeding amphibians	750 ft. (50 m) from stream edge	Encompasses non-breeding season foraging and refuge habitats and dispersal routes between pools.
Fall Kill and intermittent streams	Aquatic communities of streams	160 ft. (50 m) from stream edge	Provides streamside habitats, helps to reduce and filter surface runoff, provides shading vegetation, and provides organic material that supports the food web and habitat structure of the stream.
Casperkill	Aquatic communities of streams and wood turtle	650 ft. (200 m) from stream edge	Encompasses most of the critical habitat including hibernacula, nesting areas, spring basking sites, foraging habitat, and overland travel corridors.
Hudson River shoreline zone	Hudson River freshwater tidal communities	400 ft. (120 m) from mean high water	Accommodates for storm surges, and allows for inland migration of tidal habitats in response to sea level rise.

9 Hudsonia, p. 74.
10 Hudsonia, p. 78 (full references for table information as well).

Many historical land use decisions in the region have been made on a site-by-site basis without considering the ecological impacts on the surrounding lands. The goal of presenting detailed ecological information is that both individual landowners and City officials and planners will become more familiar with how their lands fit in with the larger ecological landscape, and that this will inspire habitat protection measures. With these measures, the City of Poughkeepsie can curb the loss of natural resources that can result from urban development. Additionally, the maintenance and conservation of greenspaces (both managed and natural) benefit the human population of the City. Aside from the aesthetic and ecological services provided by natural areas in urban settings, these spaces can be used for recreation, social gathering, community gardens, and environmental education. In these ways, greenspaces can benefit the social networks and foster place-based belonging in a community.

The means of habitat protection can be both regulatory and non-regulatory. Some examples include: volunteer conservation efforts, master planning, zoning ordinances, tax incentives, land stewardship incentives, changing permit conditions, and public education. Hudsonia suggests that the City can implement some of these general City-wide practices to foster biodiversity and habitat conservation[11].

- Protect large, contiguous, undeveloped tracts wherever possible;
- Protect high quality isolated habitat patches;
- Plan landscapes with interconnected networks of undeveloped habitats;
- Preserve natural disturbance processes;
- Restore and maintain broad buffer zones;
- Direct human uses toward the least sensitive areas and previously-disturbed areas and minimize the alteration of natural features;
- Encourage development of altered land instead of unaltered land;
- Encourage and provide incentives for developers to consider environmental concerns early in the planning process;
- Minimize areas of impervious surfaces;
- Establish land uses along the riverfront that are resilient to flooding;
- Expand public access to the Hudson River shoreline;
- Restore degraded habitats wherever possible;
- Modify the urban landscape to provide more habitat elements; and
- Promote the establishment of conservation agreements on parcels of greatest ecological value.

11 Hudsonia, 2018 p.71.

More information on all of these practices can be found beginning on p. 71 of Hudsonia's full report.

Specific recommendations for City-wide conservation planning include[12]:

1. Protecting and Restoring Habitats – large blocks of habitat that were identified as priority areas in the City of Poughkeepsie include the area along the Fall Kill near and adjacent to the DPW transfer station, Springside, and the Vassar Farm and Ecological Preserve. Specific recommendations for the conservation and management of habitats found in the City can be found starting on page 85 of the Hudsonia report.
2. Enhancement of Developed Areas – Within developed areas of the City small habitat patches exist. These small areas are important for many species and act as buffers to intact habitats and provide travel corridors as well as food and refuge for a number of different wildlife species. Specific activities that will enhance small habitats, as well as examples of ways to minimize disturbance to resident and migratory biota, can be found starting on page 89 of the Hudsonia report.

Two tools specific to the City of Poughkeepsie in the Hudsonia report are a map of Habitat Envelopes and Potential Corridors (Map 4.4) and a map of Conservation Zones (Map 4.5). Often green spaces in urban areas that provide habitat for organisms and services to the human population are quite small. However, these areas such as hedgerows, vacant lots, and even backyard trees can provide stepping stones between large habitats or refuge for many important species as well as aesthetic benefits to local neighborhoods. The Habitat Envelopes and Potential Corridors map identifies these small areas that are not large enough to be mapped as "significant habitat" but are likely acting as habitat and connecting larger habitat patches.

Conservation zones in the City of Poughkeepsie focuses on areas adjacent to the waterways located within the City: the Hudson River, Fall Kill and the Casperkill Creek. Much of the adjacent land to these waterways is already developed, but when possible actions to restore the buffer, plant trees, and create pocket parks can occur. These actions will not only increase the amount of small habitats within the City but also improve in-stream conditions.

As the City of Poughkeepsie undergoes revitalization, the natural habitats now present and possible in the City should be considered and understood as ways to reduce flooding, increase cooling, beautification, foster social cohesion and community pride, and sustain biodiversity.

12 Hudsonia, 2018 p.85

Map 4.4 Habitat Envelopes and Potential Corridors in the City of Poughkeepsie

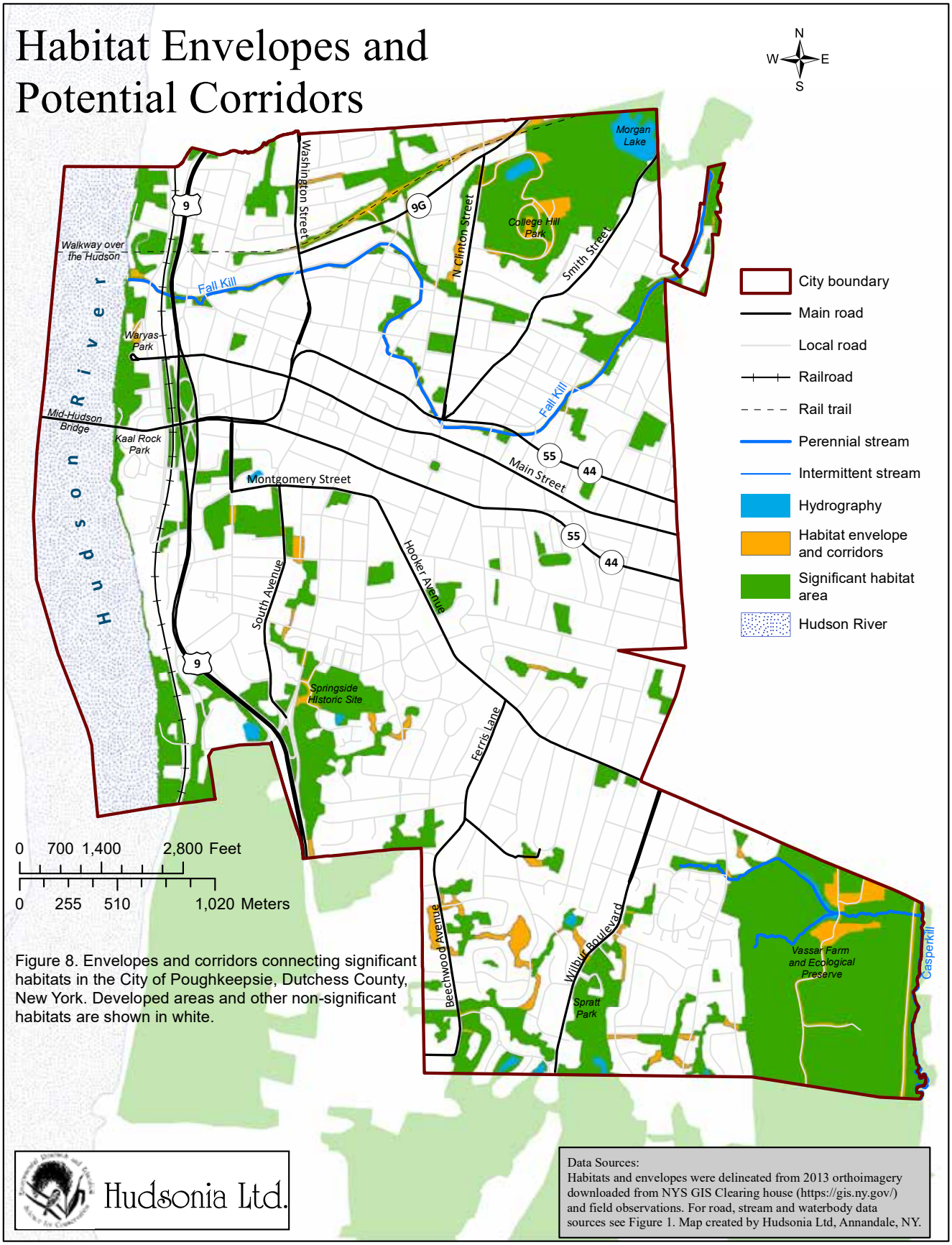

Figure 8. Envelopes and corridors connecting significant habitats in the City of Poughkeepsie, Dutchess County, New York. Developed areas and other non-significant habitats are shown in white.

Map 4.5 Conservation Zones in the City of Poughkeepsie

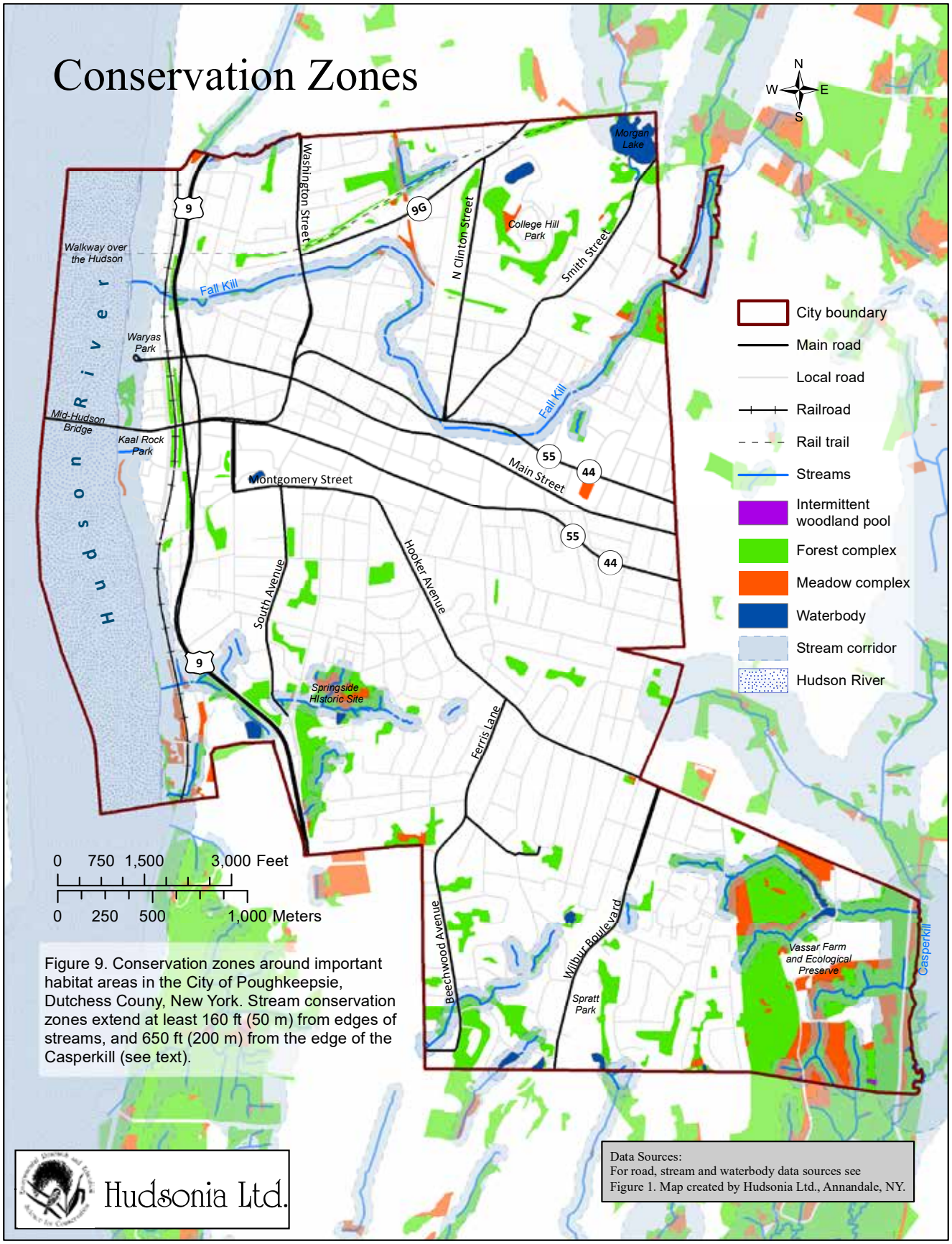

Figure 9. Conservation zones around important habitat areas in the City of Poughkeepsie, Dutchess County, New York. Stream conservation zones extend at least 160 ft (50 m) from edges of streams, and 650 ft (200 m) from the edge of the Casperkill (see text).

Full Citation:

Heffernan, Elise, and Gretchen Stevens. *Significant Habitats in the City of Poughkeepsie, Dutchess County, New York.* Hudsonia Ltd., 2018, pp. 1–123.

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