High Falls Conservation Area
Ecological Description

Presented to the Columbia Land Conservancy

by

Hawthorne Valley
Farmscape Ecology Program

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Contents

Summary

This ecological description of High Falls Conservation Area is meant to complement and update the information on natural features presented in the 2004 Management Plan. It is based on extensive field investigations conducted from March – Sept. 2013 by the Hawthorne Valley Farmscape Ecology Program team, composed of Claudia Knab-Vispo (botany and habitat map), Conrad Vispo (dragonflies and groundbeetles), Kyle Bradford (ants and amphibians), Kate Foley and Ben Derr (field assistants). Because a breeding bird survey was beyond the scope of this report, local bird expert Jeanne Bergen kindly volunteered to conduct three bird surveys during the summer and her observations are included in this report. Gretchen Stevens and Christopher Graham (Hudsonia) contributed botanical observations. Camarii Maalic Haythe assisted with fieldwork for a couple of days during his high school practicum. Duane Degutis contributed butterfly observations.

The 2004 Management Plan presented five groups of natural features: Perennial and Intermittent Streams, Riparian Corridors, Hemlock Ravine, Mixed Deciduous Woodlands, and Black Locust Grove. After careful study, we now present a habitat map that delineates eleven main ecological units, based mostly on vegetation characteristics. The map also shows the approximate locations (based on GPS readings) of intermittent streams, permanent streams and seeps (mapped with identical symbols), and remnants of stone walls that were encountered during fieldwork. For reference, we also superimposed the currently marked trails (GIS layer provided by CLC).

We describe the location and vegetation characteristics of the ecological units and discuss their relationships to underlying geology/soil characteristics and land use history. We highlight the rare and unusual plants found in each unit, as well as the invasive plants. Finally, the distribution of ants, ground beetles, amphibians and reptiles, as well as birds is discussed within the habitat framework.

The report concludes with thoughts on management, especially as it relates to safeguarding species of conservation interest and avoiding the further spread of invasive plants.

A photo essay serves to illustrate the ecological units and other features at High Falls Conservation Area, as well as select plant and animal species found there.

Habitat Map, Ecological Units, Streams & Seeps, and Stone Walls (Photos 1–15)

The habitat map is presented in Map 1 and the legend defines the ecological units we will describe below in terms of their vegetation and use as reference points for the fauna studies.

This map also indicates the approximate location of permanent streams and seeps (solid blue lines) and intermittent streams (interrupted blue lines). There are three permanent streams: the Agawamuck (Photos 1-4), which creates the waterfall known as High Falls and forms the northern boundary of the Conservation Area, the outlet of Moore Pond (Photos 5&6), which forms part of the western boundary, and the outlet of Stever's pond (Photos 7&8), which flows through a ravine in the eastern part. The other solid blue lines on Map 1 indicate seeps that seem to create saturated soils or trickling water year-round (Photo 11). Intermittent streams are more common in the eastern part of the Conservation Area, where several are clearly discernible even during dry conditions from the little gullies they formed (Photos 9&10). Most of these flow

directly into the Agawamuck, with the exception of a couple that drain into the outlet of Stever's Pond. There is also an intermittent stream bed downhill from the parking area, leading from Roxbury Road (a culvert?) straight down into the Agawamuck.

Finally, the habitat map also indicates the approximate locations of remnants of stone walls and stone piles still discernible in the Conservation Area today (Photos 12-15). Only the long and well-preserved wall roughly paralleling the south-eastern boundary corresponds with obvious differences in vegetation on either side of the wall. Most of the other wall remnants seem to be so old that we were not able to detect consistent differences in the vegetation on either side of the wall that would have given clues to differences in historical land management.

Aerial Photos and Ecological Units

Maps 2 and 3 show the outlines of the ecological units of the habitat map overlaid on a historical (1940s) and a current (2009) aerial photo, respectively. In the 1940s, there was a large meadow (uniformly light color) in the location of the current parking area. Both meadows and plowed fields are discernible in the south-western part of the current Conservation Area. The historical aerial photo also shows a small patch of bare soil (almost white signature), probably the beginnings of a gravel pit, which later seems to have been expanded in size. There was also a meadow with scattered trees/shrubs along the south-eastern boundary of the current Conservation Area. The boundary between this formerly cleared area and the adjacent forest corresponds very nicely with above-mentioned, well preserved stone wall. Some of the wooded area between the parking lot meadow and the gravel pit appears in the 1940s aerial photo as if it had recently begun reforesting (uniformly dark color, fine texture) or as if large, widely-spaced trees had been growing in a meadow (light color with coarse, darker signature of tree crowns).

More than 2/3 of the Conservation Area, however, was densely forested (coarse-grained, darker signature) in the 1940s. In the following, we will refer to all forested areas that appear also as dense forest in the 1940s aerial photo as "ancient". These are by no means "virgin" forests that have never seen any human activity. In fact, according to Jürgen Schnackenberg, the former owner of most of the land which now comprises the High Falls Conservation Area, all accessible areas have been selectively logged for Red Oak in the 1990s. However, the "ancient" forests were either never completely cleared for agriculture or have been abandoned early (thence the stone wall remnants!) and are therefore at a late successional stage of post-agricultural forest. Correspondingly, we refer to areas that appear as open fields on the 1940s aerial photo, but have since grown up, as "early successional". Finally, we use the term "successional" for a part of the forest that appears as forest on the 1940s aerial photograph, but today has a plant composition indicative of some sort of disturbance e.g., (agriculture prior to 1940 and/or selective logging?).

Geology, Soil and Ecological Units

Map 4 shows the ecological units superimposed on the digital USGS map of bedrock and surficial geology of the Conservation Area. According to the USGS map, most of the Conservation Area is covered by glacial till, while bedrock comes to the surface mostly in the southern portion. However, due to the scale of the digital map, it does not show the bedrock which is also exposed in impressive cliffs along the shores of the Agawamuck and in isolated outcroppings almost throughout the entire Conservation Area. According to the USGS map, two

very similar types of bedrock underlie the Conservation Area. Approximately the western third is underlain by the Nassau Formation, which is mostly composed of green shales and sandstones (Fisher 2006) and also contains gravel beds (hence the abandoned gravel pit in that area!). The eastern portion is underlain by the Elizaville Formation, which seems to contain the metamorphosed equivalents of the rocks found in the Nassau Formation (Fisher 2006), namely green-gray shales and argillite. As summarized in the 2004 Management Plan for High Falls Conservation Area, the predominant soil type is Nassau Channery Loam of varying slope (Nbc, Nbd, Nbe). This soil is generally shallow and acidic (but see description of the Rich Mixed Forest, below).

Species Lists

Table 1 presents the complete list of plants (329 species) found at High Falls Conservation Area during our surveys in 2013 and their occurrence in each of the ecological units. Table 2 summarizes the plant composition in each ecological unit and provides an easy comparison of the total number of species, the proportion between native and non-native species, the number of species of conservation interest, and the number of invasive plant species. Tables 3 and 4 list all plant species of conservation interest and all invasive plants observed in 2013 at High Falls and their occurrence across the ecological units. We have also compiled annotated lists of ground beetles (Table 5), ants (Table 6), reptiles and amphibians (Table 7), and birds (Table 8) found at High Falls.

Vegetation of the Ecological Units

"Ancient" Hemlock-dominated Forest (Photos 16-18)

This forest covers roughly the steep, rocky slope along the southern bank of Agawamuck Creek and is subjected to the cool, moist microclimate of the ravine. It most likely has never been completely cleared, as the bank is too steep for plowed fields or even pasture. Currently, the most common tree in the canopy is Hemlock, accompanied by Red Oak, Chestnut Oak, Black Birch, and Red Maple. Several other tree species, including Sugar Maple, White Oak, and Hop Hornbeam, also occur here, but in very low densities. Finally, this is one of only two ecological units at High Falls where American Beech occurs. The largest of the dominant trees reach a dbh of ~20 inches. The canopy is mostly quite closed, creating a shady understory. Correspondingly, the shrub layer is sparse, mostly composed of young Hemlocks, Hop Hornbeam, Black Birch, and Red Maple. Witchhazel, Maple-leaved Viburnum, and Blueberries become more common around small openings in the canopy. There are very few vines, the most common being Virginia Creeper. The ground layer is generally very sparse, but a decent number of herbaceous and a large number of fern species are represented. The most common herbaceous plants are Canada Mayflower, White Wood Aster, Jack-in-the-Pulpit, and Wild Sarsaparilla. The most common ferns are Evergreen and Marginal Woodfern. Hay-scented Fern occurs in small patches around canopy openings. Almost no grasses and sedges occur in this forest. Over all, this forest is botanically not exceptionally rich, but it has the highest proportion of native plants of all ecological units at High Falls, and the lowest number and density of invasive species (Tables 2 & 4). We found two plant species of conservation interests in this ecological unit: American Fly-Honeysuckle and Flowering Dogwood.

We found Woolly Adelgid on several of the Hemlock trees, but did not notice any trees that were clearly succumbing to this pest (yet?). Many of the American Beech trees show signs of beech bark disease (Photo 18), but we also have not noticed any dead or dying beech trees.

"Ancient" Mixed Forest (Photos 19-27)

This forest covers most of the southern corner of the Conservation Area, south and east of the red trail after it emerges from the Black Locust Stand, and on both sides of the red trail before it merges with the green trail. There is also a small patch of "Ancient" Mixed Forest on both sides of the green trail near the entrance between the bridge over Moore Pond outlet and the intersection with the red trail. It is located on gently sloping to relatively steep terrain, characterized by thin soils which are interrupted by many bedrock outcrops. The microclimate in this ecological unit seems to be much drier and warmer than in the "Ancient" Hemlock-dominated Forest. Most likely, none of the soils were ever plowed, but the remnants of stone walls or at least stone piles (Photos 13&15) indicate that people once labored in this unit. Maybe parts of it had been cleared early on for pasture? Or animals were long ago pastured under the trees in the forest?

Today, this is one of the most species-rich forest stands at High Falls (Table 2). The canopy is mostly composed of Red Oak, Sugar Maple and Red Maple. Hemlock and Black Birch occur in patches. Many other tree species, including Chestnut Oak, Shagbark Hickory and Musclewood, are represented in smaller numbers. The canopy is relatively closed, but outside of the Hemlock patches, enough light reaches the forest floor to allow the persistence of lawn-like areas of Pennsylvania Sedge. This ecological unit is one of the most diverse in herbaceous and gramineous plants, as well as ferns. Some of the most common species in these groups are the same as those in the "Ancient" Hemlock-dominated Forest. But the already familiar White Wood Aster and Canada Mayflower are here accompanied by Starflower (Photo 23), White Snakeroot, Rue Anemone (Photo 26), Downy Solomon's Seal, Forked Chickweed, and Bluestem Goldenrod, amongst many others, including 15 species of woodland sedges, five species of woodland grasses, and nine species of ferns. Exclusively around the bedrock outcrops one finds Early Saxifrage, Columbine, Smooth Rock Cress, Small-floer Bitter Cress, and Rock Polypody. Gaywings (Photo 24), Round-leaved Hepatica (Photo 25), and Schreber's Aster (Photo 27) were unique to this ecological unit. The shrub layer is not very dense, but species-rich. Unfortunately it also contains a few invasive species, such as Multiflora Rose, Japanese Barberry, and *Lonicera morrowii/bella*. However, the total number of invasive species and their densities in this unit are amongst the lowest in the Conservation Area. This unit seems to have a comparatively high number of species of conservation interest, including several species not found anywhere else at High Falls (Tables 2 & 3). However, some of the identifications of these potentially interesting species are tentative, because the plants were not observed in flower or otherwise in a state which would have allowed definite identification.

Early Successional Mixed Forest (Photos 28-30)

This unit is a narrow strip of open forest located on relatively flat ground along the south-eastern boundary of the Conservation Area, between the neighboring field and the large stand of "Ancient" Mixed Forest described above. It is separated from the latter by a well preserved stone wall running roughly N-S, parallel to the property line (Photo 30). The area of this unit appears on the 1940s aerial photo as a meadow with widely spaced trees or shrubs, potentially a pasture. Today, it is traversed by a farm road and characterized by a somewhat open canopy of trees, ample ground cover, but relatively few and small shrubs. The most common trees are Sugar Maple (to 15" dbh) and Hop Hornbeam (3-6" dbh), accompanied by Red Oak (to 18" dbh), Pignut Hickory (to 12" dbh), and White Pine (to 16" dbh). The most common shrubs, none of which exceeds 3 feet in height, are invasive Honeysuckle (*Lonicera morrowii/bella*) and Multiflora Rose, and the native Deerberry. Virginia Creeper is present, but mostly as a ground cover. The ground flora is characterized by a high diversity of grasses and sedges, but almost no ferns. The most common plants in this layer are the invasive Garlic Mustard, and the native White Wood Aster and White Snakeroot (Photo 28). The only plant of conservation interest found in this unit is the Hay Sedge.

"Ancient" Sugar Maple-dominated Forest (Photo 31-33)

This is a small patch of forest located south of the green trail and west of the red trail along the Moore Pond outlet and the property line, reaching up the slope, but changing character on the flatter plateau. Again, this forest is clearly not an undisturbed forest, but it is visible as a forest on the 1940s aerial photo and is characterized by a dense canopy dominated by Sugar Maple, which is accompanied by Red Maple, Red Oak, and Hophornbeam, as well as a few other tree species. The shrub layer is generally sparse, composed almost exclusively of Spicebush with some small Multiflora Rose and Japanese Barberry. The ground layer is sparse and comparatively poor in species. The relatively low biodiversity of this patch might in part be explained by its much smaller size compared to the two units described above. Nevertheless, four species of conservation interest occur here: Alternate-leaved Dogwood which was found in no other unit at High Falls, Bloodroot (Photo 32) and Hay Sedge, which occurred at one other unit, as well as the locally relatively common Blue Cohosh (Table 3). The "usual suspects" of invasive plants are present, with Garlic Mustard being one of the most common plants in the ground layer (Table 4).

Early Successional Gravel Pit (Photos 34&35)

This unit might well represent, together with the parking lot area, the most recently disturbed vegetation at High Falls. It is not at all visible from any trails and is located between the red trail, the maintenance road, and the Moore Pond outlet. In the 1940s aerial photo it appears as a meadow with a small patch of bare soil/gravel? Since then, it seems as if extensive excavation of the gravelly soil has taken place, creating a pit with steep banks and a bottom approx. 20 feet lower than the adjacent Early Successional Black Locust Stand. There are several small depressions that have wetland character, others are mere puddles that seem to function as vernal pools. According to Jürgen Schnackenberg, the pit had long been abandoned by the 1970s, when he purchased the property. Although the ground is basically covered with a tall layer of

herbaceous vegetation and shrubs dominate in patches, the trees still do not form a continuous canopy. The most common trees are relatively large Cottonwood (to 15" dbh), with somewhat smaller Black Locust, American Elm, White Ash, and Tree-of-Heaven. Where shrubs occur, the shrub layer is dominated by the invasive Honeysuckle (*Lonicera morrowii/bella*) and Multiflora Rose. However, the native Spicebush is also quite common. The most common plants in the ground layer are a mix of "weedy", non-native species, such as Common Chickweed and Ground Ivy, the invasive Garlic Mustard, Dame's Rocket, and Japanese Stiltgrass, with the native Smooth Goldenrod, Common Violet, White Snakeroot, and Wild Bergamot. Plant diversity is relatively high in this unit, where openland and forest, upland and wetland species co-occur. At the same time, this is one of the units with the highest number and proportion of non-native plant species (Table 2), including many invasives (Table 4). Nevertheless, we also found three species of conservation interest (Table 3), one of which, the regionally rare Silvery Spleenwort, being unique to this unit within the Conservation Area.

Early Successional Black Locust Stand (Photos 36-44)

This unit is somewhat similar in its vegetation composition to the gravel pit, but has a better developed tree canopy and much denser shrub layer. It can be observed around the parking area and along the middle section of the red trail, as well as all along the maintenance road. We have never seen a patch of vegetation quite like it and suspect that this does not represent the outcome of straightforward old field succession, but that most of the soils underlying this unit had been reworked as part of the gravel operation. Whatever its history, this unit is striking in its variety and especially abundance of invasive species. The tree layer is mostly composed of Black Locust (Photo 36-38), which is native further south in Eastern North America, but considered invasive in New England and New York, the invasive Tree-of-Heaven (Photos 39&40), and White Pine, accompanied by other species, such as Red and Sugar Maple, White Ash, Boxelder, Mulberry, Black Walnut and Black Cherry, which all occur in very small numbers. Around the parking area, Sycamore and Cottonwood are also prominent. The shrub layer, which is almost contiguous and in many places 6 feet tall, is dominated by invasive Honeysuckle (*Lonicera morrowii/bella*, Photo 36), accompanied by Multiflora Rose and native Blackberry and Raspberries. Virginia Creeper is the most prevalent vine, growing in almost all the tall trees (Photo 37), but Poison Ivy is also common in patches. The ground layer has quite a variety of grasses, sedges, and ferns, but lesser diversity in the other herbaceous plant groups. Dominant species in this layer are the weedy, non-native Common Chickweed (Photo 42), the invasive Japanese Stiltgrass (Photo 43&44) and Garlic Mustard, as well as the native Jack-in-the-Pulpit (Photo 42), White Snakeroot, and Enchanter's Nightshade. The only plant species of conservation interest discovered in this unit was a small patch of Ostrich Fern. To simplify the habitat map, we also included a narrow strip of forest along Roxbury Road just north of the parking area, in this unit. It is located on the very steep bank between the road and the Agawamuck and is not easily accessible. Although it might have somewhat different characteristics (e.g., seemingly deeper soils, more closed canopy, less ground cover), it seemed to group generally well with the Black Locust Stand. We refrained from surveying in any detail the narrow area along the right-of-way for the maintenance road in the south-west corner, but it seems to also best fit into this ecological unit.

Successional Mixed Forest (Photo 45&46)

This unit is located north of the Early Successional Black Locust Stand, and while Black Locust also occurs, it is not as common as in the preceding unit. Some of this Successional Mixed Forest can be observed just east of the red trail and was closed-canopy forest in the 1940s. The part of this unit located west of the red trail is harder to interpret on the 1940s aerial photo, but seemed to have been at least partially open. On both sides of the trail, the current canopy is characterized by the rarity of Oaks and Hickories. Instead it is composed mostly of Red and Sugar Maple, mixed with White Ash, Black Locust, Black Cherry, White Pine, and Tree-of-Heaven. It is possible, that this unit was intensively logged for Red Oak in the 1990s, creating canopy gaps that then facilitated the growth of vines and shrubs. Virginia Creeper and Grape vines are present in many trees, Poison Ivy is common on the ground. The shrub layer is well developed, especially on the east side of the red trail, with invasive Honeysuckle (*Lonicera morrowii/bella*), Multiflora Rose, Japanese Barberry, Blackberry, and Raspberry, as well as some Spicebush and Elderberry. The ground layer is species-poor and dominated by some of the same species seen in the Early Successional Black Locust Forest: Garlic Mustard, Common Chickweed, Common Violet and White Snakeroot. A single species of conservation interest was discovered in this unit, the regionally scarce Northern Beech Fern (Photo 46). The number and density of invasives is not quite as high as in the neighboring Early Successional Black Locust Forest.

Floodplain Forest (Photos 47-52)

There are three small units of Floodplain Forest in the Conservation Area. They occur on low banks of the Agawamuck in the few areas where the bank does not rise steeply right from the creek's edge. They are exposed to occasional physical disturbance by high water, but at the same time are subject to silt deposition by floods, which enriches the soil with nutrients and brings seeds and other plant propagules from upriver. In spite of the small overall area of these units, they contain a high diversity of plants and a good proportion of native plants (Table 2). However, the Floodplain Forest has also the largest diversity of invasives in the entire Conservation Area (Table 4). The tree canopy is closed and composed of a large number of different species. Most common are Red Maple, Sugar Maple, and Basswood, accompanied by Black Locust, White Ash, Yellow Birch, Black Birch, Sycamore, Hemlock, and a variety of additional species which are present in very small numbers. The largest trees (Sycamore and Basswood) reach more than 20" dbh. The understory has a mix of Hop Hornbeam, Musclewood, and Witchhazel. Shrubs tend to be sparse and small, and are mostly represented by Spicebush and Japanese Barberry. Virginia Creeper is present mostly as a ground cover. The ground layer is botanically diverse, but its vegetation cover is patchy. The most common herbaceous plants in the Floodplain Forest are the invasive Garlic Mustard and Japanese Knotweed (Photos 50-52), as well as the native Wood Nettle (Photo 47), White Wood Aster, Orange Jewelweed, Trout Lily, Early Meadow-rue, Broad-leaved Toothwort, White Grass, and Evergreen Woodfern. But they are joined by a large variety of less common grasses and sedges, ferns, and other herbaceous species. The most exciting plants of conservation interest in this unit are the regionally-rare False Mermaid-weed, which is limited to floodplain forests throughout its range, and the regionally-rare Leatherwood (Photo 48). Yellow Jewelweed and Blue Cohosh are also of conservation interest, but a bit more widely distributed (Table 3).

Rocky Creekbed and Gravelly Island (Photos 53-56)

These two units are located in the Agawamuck. The Rocky Creekbed is located just downriver from the pool at the bottom of the Falls and is composed of large boulders. The Gravelly Island is also known as "Snake Island", and is a cobble bar in the center of the creek a tenth of a mile downriver from the pool. We did not attempt complete botanical inventories of these units, but made some observations worth sharing.

The Rocky Creekbed below the Falls has a at least two herbaceous plants not found anywhere else in the Conservation Area. Gold-moss (Photo 55), which is not a moss but a species of *Sedum*, a flowering plant with small, yellow, star-shaped flowers, forms extensive patches right on the boulders and the invasive Orange Daylily grows between the boulders. They are accompanied by the native Tussock Sedge (Photo 54), Herb-Robert (Photo 56), Hooked Buttercup, Tall Meadow-rue, Marsh Blue Violet, Pennsylvania Bittercress, and White Panicled Aster.

The Gravelly Island is striking in its density of the invasive Japanese Knotweed (Photo 54).

Rich Mixed Forest, incl. Ravines & Ledge/Talus (Photo 57-72)

This large unit contains the botanically most interesting and most heterogeneous forest stand at High Falls. It includes the bed of a permanent stream, the outlet of Stever's Pond (Photos 57&58), which forms a clay ravine with very steep banks and has a couple of clay ravines merging from the east (Photo 59). It also includes steep rocky ledges (Photo 60), and associated talus slopes on both sides of the stream, several seeps, where groundwater emerges on the surface year-round, keeping the ground moist, as well as a number of intermittent streams which only run during snow melt or after strong rains. This diversity of micro-habitats, together with the moister (and maybe deeper?) soils, cool and moist microclimate along the streams, and possibly also some difference in soil chemistry (more calcium?), seem to be responsible for the botanical diversity and uniqueness of the flora in this Rich Mixed Forest. Twenty plant species were found only in this unit and nowhere else at High Falls!

The entire area appears as forested on the 1940s aerial photo, but the instable slopes and shifting creek beds seem to have maintained a certain level of natural disturbance in the area. Therefore, we were hesitant to label this unit as "ancient". Currently, the canopy of this Rich Mixed Forest is dominated by Sugar Maple, which is accompanied by occasional Red Oak, Hemlock, Basswood, Tulip Tree, Horse Chestnut, Bitternut Hickory, the invasive Tree-of-Heaven and Norway Maple, as well as American Beech and locally very common Yellow Birch. Sugar Maple becomes markedly less common in the ravine along the permanent stream. Yellow Birch dominates the steep rocky slope below the outlook (Photo 60). Witch Hazel and Striped Maple occasionally occur in the understory. The shrub layer in this forest is sparse, but diverse, including Maple-leaved Viburnum, Raspberry and Blackberry, Red Elderberry, American Yew, Purple Flowering Raspberry, Pink Azalea, Northern Bush Honeysuckle, and American Fly Honeysuckle. There are also some invasive Multiflora Rose and Japanese Barberry bushes.

The ground layer is patchy and gets most dense on the talus slope at the base of the cliffs next to the pool, at the end of the inofficial trail leading past the barred gate at the outlook down to the Agawamuck. The ubiquitous White Wood Aster, White Snakeroot and the invasive Garlic

Mustard are among the most common herbaceous plants, but also common (and if unique to this unit, marked with *) are Jack-in-the-Pulpit, *Wild Ginger (Photo 62), Foamflower (Photo 63), Spotted Jewelweed, Columbine (Photo 65), Blue Cohosh (Photo 68), Broad-leaved Toothwort, Trout Lily, False Solomon's Seal, Downy Solomon's Seal, Red Trillium, White and Red Baneberry, *Miterwort, Kidney-leaved Buttercup, Early Meadow-rue, Clearweed, and a variety of violets, such as Early Blue Violet (Photo 69), Downy Wood Violet (Photo 70), Long-spurred Violet (Photo 71), Sweet White Violet (Photo 72), and Common Violet. The fern flora is well represented, both in density and diversity, featuring amongst others Evergreen, Marginal, and Spinulose Woodfern, Christmas Fern, patchy Hay-scented Fern, occasional New York and Lady Fern, as well as *Maidenhair Spleenwort at the base of the cliff east of the stream and *Bulblet Fern (Photo 64) at the base of the cliffs below the lookout. Invasive species are diverse but not overwhelmingly common, although the largest Tree-of-Heaven observed at High Falls grows in a ravine east of the outlet of Stever's Pond and has an estimated dbh of 25". The Rich Mixed Forest has the highest number of plant species of conservation interest in the Conservation Area, including six species that were not observed in any other unit: American Yew, Mountain Maple (Photo 61), American Spikenard (Photos 66&67), Maidenhair Spleenwort, Dutchman's Breeches, and American Chestnut (Tables 2 & 3).

Meadow (Photos 73&74)

The parking area is surrounded by a meadow which is composed to almost 50% of non-native species, and harbors no species of conservation interest. It has a suite of common native and non-native old field species, such as a variety of grasses, goldenrods, asters, and other herbaceous plants. Small trees are interspersed, mostly Black Locust, Tree-of-Heaven, Cottonwood, Sycamore, Staghorn Sumac, and Boxelder, as are some shrubs, mostly brambles and the invasive Honeysuckle (*Lonicera morrowii/bella*) and Multiflora Rose. Amongst the herbaceous plants are also several invasives, two of which are not found anywhere else in the Conservation Area: Mugwort (Photo 73) and Spotted Knapweed. The very aggressive Japanese Stiltgrass, which is also common in the early succesional forest stands, is dominant in the southern meadow patch (Photo 74).

Animals

Ground Beetles (Photo 75-84)

As listed in Table 5, we collected 161 ground beetles of 34 species at the High Fall Conservation Area; three of these species (marked "EX" on the table) were non-native. The apparent biotope preference of each species, based on the existing literature, is indicated and color coded. None of these species seems to be particularly rare; but they help add dimensions to the ecological units defined by vegetation characters and topography.

The Ground Beetle community at High Falls can be divided into three major groups (beetles of forest, opening, and wet areas). These can, as indicated in the table, be further subdivided based on type of forest, nature of opening, and hydrology. Of course, beetles are not responding to generalities indicated by our biotope names, and some beetles are more or less broad in their own habitat choices.

Stream margins and the interfaces with other wetlands typically abound in ground beetles. Wet-area beetles at High Falls included species in the genera *Agonum, Anisodactylus, Platynus, Bembidion, Chlaenius, and Nebria*. The last three genera were mainly stream-bank species and were found almost exclusively in sites with such habitat (in the Floodplain Forest of the Agawamuck and along the shores of the outlets of Moore and Stever's Pond). Four other species, while not really wetland beetles, are primarily associated with moist, wooded areas; for example, *Platynus tenuicollis* was found in the Floodplain Forest of the Agawamuck, along the two smaller permanent streams, but also in moist micro-habitats in the "Ancient" Mixed Forest and the Early Succession Gravel Pit. *Bembidion*, a genus of usually tiny, shoreline beetles, is surely underrepresented due to the small size of these beetles; their apparent absence from the outlet of Stever's Pond is probably a sampling artifact. A last class of wet-area beetles occurs in a variety of wetlands, but seems to neither require forest cover nor stream-bank conditions; its occurrence at High Falls seemed to largely parallel that of the other two wet-area groups.

The ground beetles in upland forests were dominated by *Pterostychus*, esp. *P. tristis* (Photo 76) and, to a lesser degree, *P. rostratus* (Photo 75). These are common forest ground beetles in our region area and were widespread across the Conservation Area in the "ancient", successional, and rich mixed forests, but not in the Early Succesional Gravel Pit. Neither of these species can fly, they are probably long-term forest resident species and not adapted to the quick exploitation of temporary disturbances (such species are usually winged). The "Ancient" Mixed Forest, while not uniquely diverse in ground beetles, had the highest beetle abundance of the upland sites.

Three species are reported to be largely confined to deciduous forests and, appropriately, were not found in the "Ancient" Hemlock-dominated Forest.

A suite of edge and opening species were found in some younger forests and occasionally elsewhere. Our three non-native species were part of this group, and all three of these occurred in the Early Successional Black Locust Stand. However, the Early Succesional Gravel Pit had none of these species. Interestingly, two of the gravel pit species were typical of moist areas (*Anisodactylus harrisii* and *Stenolophus ochreopezus*) and were probably found around the gravel pit's small wetlands or vernal pools. Another native openland species, *Elaphropus californicus*, was found in the meadow near the parking lot.

Finally, one species, *Pterostychus stygicus* (Photo 78), seems to be something of a generalist and, while not common, was found at both the Early Successional Gravel Pit and the Early Succesional Mixed Forest.

Ants (Photos 85-94)

In all, 360 ants were collected representing 29 species in 14 genera. This does not include two uncertain species, *Aphaenogaster cf. fulva* and the queens that are most likely *Lasius alienus*.

Results are summarized in Table 6 with species organized and color-coded by their biotope preference. Preference was based on information in *The Ants of Ohio* (Coovert, 2005) and *A Field Guide to the Ants of New England* (Ellison et al, 2012).

One species, known as The Pavement Ant (*Tetramorium caespitum*), is non-native and is marked with EX. This species is native to Europe and was only found in the parking lot meadow. This species is not considered invasive, but its presence may indicate the disturbed nature of this area.

40% of all ants collected were of the genus *Aphaenogaster*. The three *Aphaenogaster* species collected (*A. fulva*, *A. picea*, and *A. rudis*) are important seed dispersers of woodland herbs. Overall, the most abundant species collected were *Aphaenogaster picea* 28% (Photo 85), *Aphaenogaster fulva* 13% (Photo 86), and *Lasius alienus* 10% (Photo 87). These *Aphaenogaster* species and *Lasius alienus* are common throughout the region in forested habitats and were found in most forested ecological units at High Falls.

Aphaenogaster picea was found in all forested units that were not floodplain (or in stream microhabitats), but was the only species found in the seep of the Rich Mixed Forest.

In the parking lot meadow only species of open habitat or general ecological affinity were found.

Most ant species (n=14) were found in the two combined units of the "Ancient" Mixed Forest. This forest has generally dry, thin, rocky soils and in several places enough light coming through the canopy to allow for the persistence of extensive patches of Pennsylvania Sedge. It seems as if the dry, somewhat sunny conditions on the forest floor combined with a long history of little disturbance favor a diversity of ant species and create conditions that allow several unique species to occur here and nowhere else at High Falls.

One particularly interesting find in this unit was the slave making ant, *Formica subintegra* (Photo 90). Enslavement for this species involves raiding *Formica fusca* group species' nests, taking brood, and returning to their home nests where they raise the stolen brood as slaves. *F. subintegra* was found with its host *Formica subsericea* (Photo 91) under a log in the northern unit of the "Ancient" Mixed Forest (around the western intersection between the green and blue trail). This forest has a lawn of Pennsylvania Sedge and a somewhat open canopy. *F. subintegra* generally prefers open habitats including open woods, fields and edges.

In no other unit was a slave making ant found. The somewhat open canopy and dry rocky ground of the "Ancient" Mixed Forest may be unique to High Falls and the presence of *F. subintegra* in only that unit may reflect that uniqueness. The presence of slave making species may give an indication of ecological integrity. The same northern unit of the "Ancient" Mixed Forest was the only site where *Myrmica detritinodis* (Photo 92) was found. Ellison et al. note this species as "a good indicator of mature forests."

Another interesting species to note from the "Ancient" Mixed Forest is *Camponotus americanus* (Photo 88). This ant belongs to the carpenter ant genus. In two field seasons of sampling for the "Living Land Project" throughout Columbia County, we have only found this species twice, both incidences occurring in 2013. One occurrence was at an exposed site on top of the Taconics in Taconic State Park and the other at High Falls in the "Ancient" Mixed Forest. Interestingly, this species is widespread through southern and coastal New England. It is hard to say whether it is locally rare or just elusive. It might have escaped our notice because of its nocturnal foraging habit and/or because its nests, which tend to be deep in the soil, might be hard to detect,

especially during diurnal surveys, if no foragers are at the surface. However, these reasons for the rarity of this species in our surveys are very speculative, and, as is often the case for ants, more research is needed into this species' ecology and biogeography.

Even though Ellison et al describe this species as a nocturnal forager this does not necessarily mean foragers are not out during the day. Coovert notes that in Ohio worker ants are usually found foraging during the day. However, in our region, workers may be less likely to be active during the day. Therefore, it may be more likely to find *C. americanus* at its nest. This may be, in itself, difficult. It is thought that their nest preference is in soil underground, often under stones or rotten logs. In this case, the nest site may look like any other soil nesting ant nest, with excavated soil and entry/exit hole(s). If a nest was found it is unclear how often workers would emerge when the nest was provoked during the day.

When we found *C. americanus*, workers were collected from the nest. At High Falls the nest was found under a log with relatively few workers present and active. A similar situation happened in the Taconics with the only difference being that the nest was under a rock. In both cases no foragers were found outside of the nest. Both the site in the Taconics and at High Falls had thin soil which may play a role in why workers were above ground at their nest site.

Overnight pit traps or bait traps may be better sampling methods to understand this species' abundance at High Falls and regionally. In any case it is important and interesting to note *C. americanus*' presence at High Falls.

Another diverse site for ants is the Successional Mixed Forest where we found 13 ant species. In addition to dry, somewhat open, "ancient" forests, ant assemblages are often most diverse in open habitats, and those of disturbed and early successional status. With that said, high ant species richness in the Successional Mixed Forest is consistent with our conclusion from the vegetation study that this ecological unit has seen some disturbance in the past. Logging would have opened the canopy and created slash. Openings in the canopy would create warm spots inviting more ant species, and slash left over from logging, might create more nest sites. However, maybe due to the time that has elapsed since the last disturbance in this unit, no open habitat ant species were found in the Successional Mixed Forest.

The seemingly high ant diversity both in the "Ancient" Hemlock-dominated Forest and in the Rich Mixed Forest needs to be interpreted carefully. As indicated in Table 6, six of the 13 species found in the "Ancient" Hemlock-dominated Forest were present only in a little clearing around the eastern intersection of the green and blue trail. Fewer Hemlocks in the canopy and three trails running through the area, probably created the sunny micro-habitat that favors ants. This may explain the presence of the edge dwelling *Crematogaster lineolata* (Photo 89) at this site. The rest of the "Ancient" Hemlock-dominated Forest had a relatively low ant diversity (n=7). Similarly, five of the 12 ant species found in the Rich Mixed Forest were found exclusively in the dry bed of an intermittent stream, leaving the rest of this forest with the same relatively low ant diversity (n=7).

The ecological units with the next highest ant diversity are the Early Successional Gravel Pit and the Early Succesional Mixed Forest with 10 ant species, each. These two units fit the generality that high diversity occurs in early successional and recently disturbed habitats.

Dragonflies (Photos 95-97)

The following riverine dragonflies were recorded along the Agawamuck during our early June visit:

- Least Clubtail (adult & exuvia, S5, our 6th county record)
- Riffle Snaketail (S2/3, our 5th county record)
- Twin-spotted Spiketail (S5, our 3rd county records)
- Fragile Forktail (common)
- Common Baskettail (adult & exuvia)

The first three species are uncommon in Columbia County and reproduce only in fast-flowing, oxygen-rich, cool streams. The Least Clubtail (Photo 96) was actually observed emerging from its exuvia (the skin of its aquatic larva) at the shore of the Agawamuck, a sure sign that this species reproduces at High Falls. We suspect that even the Riffle Snaketail (Photo 95) and Twin-spotted Spiketail (Photo 97), which were only observed as adults near the Agawamuck, were also reproducing within the Conservation Area.

The other two dragonfly species are more commonly seen throughout the County and are not as specific in their requirements for breeding habitat, reproducing in a wide range of wetlands.

Herpetofauna (Photos 104-107)

While searching for ground beetles and ants, herpetofauna (reptiles and amphibians) was also noted when discovered. Individuals were identified in the field. Table 7 shows a list of species found in the ecological units at High Falls. Herpetofauna was found in all but two units which were the Meadow and the Early Successional Mixed Forest. The salamander species found were Red Back/Lead Back (*Plethodon cinereus*), Dusky (*Desmognathus ochrophaeus*, Photos 104&105) and Two-lined (*Eurycea bislineata*). Frogs were less abundant and two species were found, Green Frog (*Rana clamitans*) and Wood Frog (*Rana sylvatica*). The only other herpetofauna found were American Toads (*Bufo americanus*) and Gartersnakes (*Thamnophis sirtalis* (Photos 106&107). Red Back and Lead Back Salamanders were distinguished in the field and are reported separately, although it should be noted that these are two color morphs of the same species *Plethodon cinereus*.

Figures 1 and 2 show the abundance of salamanders found at upland and wetland sites, respectively. The abundance was determined by taking the number of individuals found for each species and dividing it by the sum of rocks and logs explored. The abundance is presented as a percentage of rocks & logs flipped where salamanders were detected. Counts for Red Back and Lead Back Salamanders were combined for each site.

Figure 1 shows that Dusky and Two-lined Salamanders are rarely found far from water. Red and Lead Back Salamanders, however, seem to be more general in their distribution, as long as a site is neither too dry nor too wet. They also seem to be slow in colonizing early successional habitats. They were absent from the Meadow around the parking area and from the Early Successional Mixed Forest. They were most common in the "Ancient" Sugar Maple-dominated Forest, the Rich Mixed Forest, the "Ancient" Hemlock-dominated Forest and the Succesional Mixed Forest. They were present in small numbers in the Early Successional Gravel Pit and Black Locust Forest. However, they were also present in only very small numbers in the "Ancient" Mixed Forest, which is probably due to the dryer microhabitat in this ecological unit. Overall, Red Back Salamanders are the most abundant salamander species in the conservation area.

One species which seems obviously missing from our list is the Red-spotted Newt (*Notophthalmus viridescens*), whose juvenile terrestrial individuals are known as Red Efts. In local forests Red Efts can seem ubiquitous. It is uncertain why we did not observe any Red Efts at High Falls. Their life cycle requires a pond or a lake no more than 800m from suitable forested habitat (Healy, 1974). From looking at an aerial photo of the surrounding area there looks to be at least one pond well within 800m. We do not know the management of this pond, and therefore, cannot comment on its attractiveness to Red-spotted Newts. A number of reasons including fragmentation in the surrounding area from cultivated fields, road ways, and other development may play a role in their absence.

Additional amphibian and reptile species are likely to be also present at the conservation area. Our observations were largely incidental, made while turning rocks and logs in search for ants and ground beetles, or "stumbling" upon the herps while surveying vegetation and insects. For example, Pickerel Frogs and Grey Tree Frogs seem likely, and the occurrence of at least one Wood Frog would suggest that mole salamanders (for example, Spotted and Jefferson's Salamanders) might also live in the area. While ponds and classic vernal pools are absent from the Conservation Area, we did notice a few small wetland areas and seasonal puddles in the Early Successional Gravel Pit. This would be the only place where vernal pool amphibians might be breeding inside the Conservation Area. However, during our visit of that area in May we did not note any amphibian eggs in those wetlands and pools. Northern Watersnakes frequent the Agawamuck upriver from High Falls and might well also be present, unless they have been eradicated over the years by visitors to the Falls.

Birds

A breeding bird survey was not within the scope of this study. However, local bird expert Jeanne Bergen graciously shared her bird observations made during three visits (July 9, 15, and 31, 2013) to High Falls Conservation Area. During each visit, she walked the entire trail system and documented all the birds noted by eye or ear. Later on, she indicated to us which birds had been noted in which ecological units. Table 8 lists all the birds reported by Jeanne Bergen grouped by ecological units.

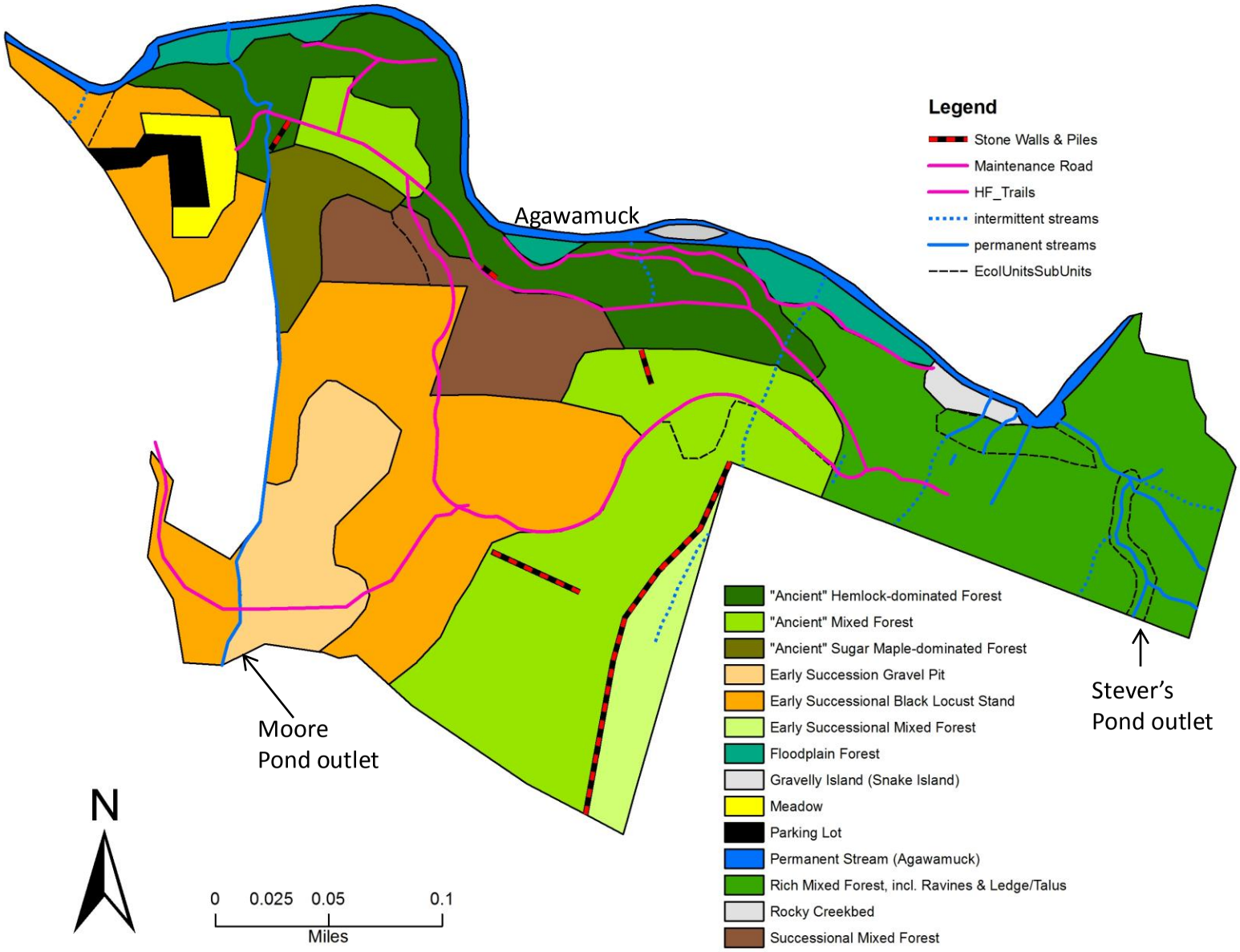
Only the Veery and Wood Thrush were observed in the "Ancient" Mixed Forest. According to the 2nd Atlas of Breeding Birds in NYS, both of these species are declining steadily throughout the state and are woodland birds which prefer to breed in mature forests.

The largest number of birds were seen or heard by Jeanne Bergen in the Early Successional Black Locust Forest, where she observed many different species happily feeding among the vines in the canopy. We had also noted during the vegetation surveys, that there was always bird activity in this ecological unit. Most of the birds that were observed here are relatively common and their populations throughout the state seem to be stable, if not increasing. However, there are two exceptions. The Eastern Towhee is a shrubland bird which, because of its declining numbers has been classified as a continental stewardship species by Partners in Flight. The Eastern Wood-Pewee prefers open forests and although it doesn't mind edges, is nevertheless declining throughout the state.

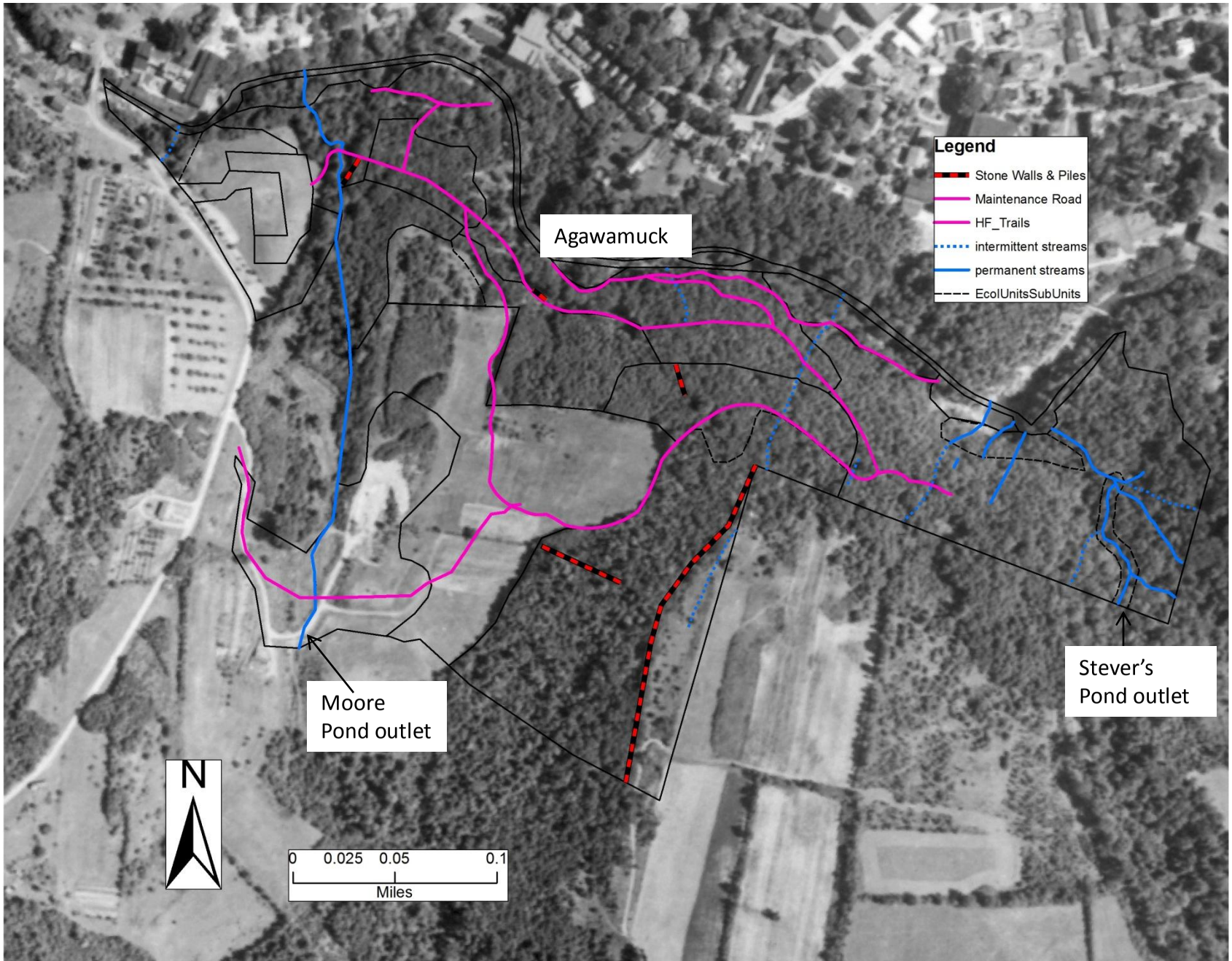
A number of birds were observed exclusively along the riparian corridor of the Agawamuck. Noteworthy among them is the Belted Kingfisher, which is declining in numbers throughout its range, but not listed as a species of conservation concern in our region. On September 19th, Claudia Knab-Vispo observed a tiny wren with exceptionally short tail, but no other noteworthy markings, hopping about roots and fallen logs along the shore of the Agawamuck. This might well have been a Winter Wren, a species that is not known to breed at such low elevation in our county. However, it might have been stopping over during migration.

It should be noted that the barred trail down to the pool was not included in the bird surveys and therefore, we can currently not adequately assess the importance of the Rich Mixed Forest for birds.

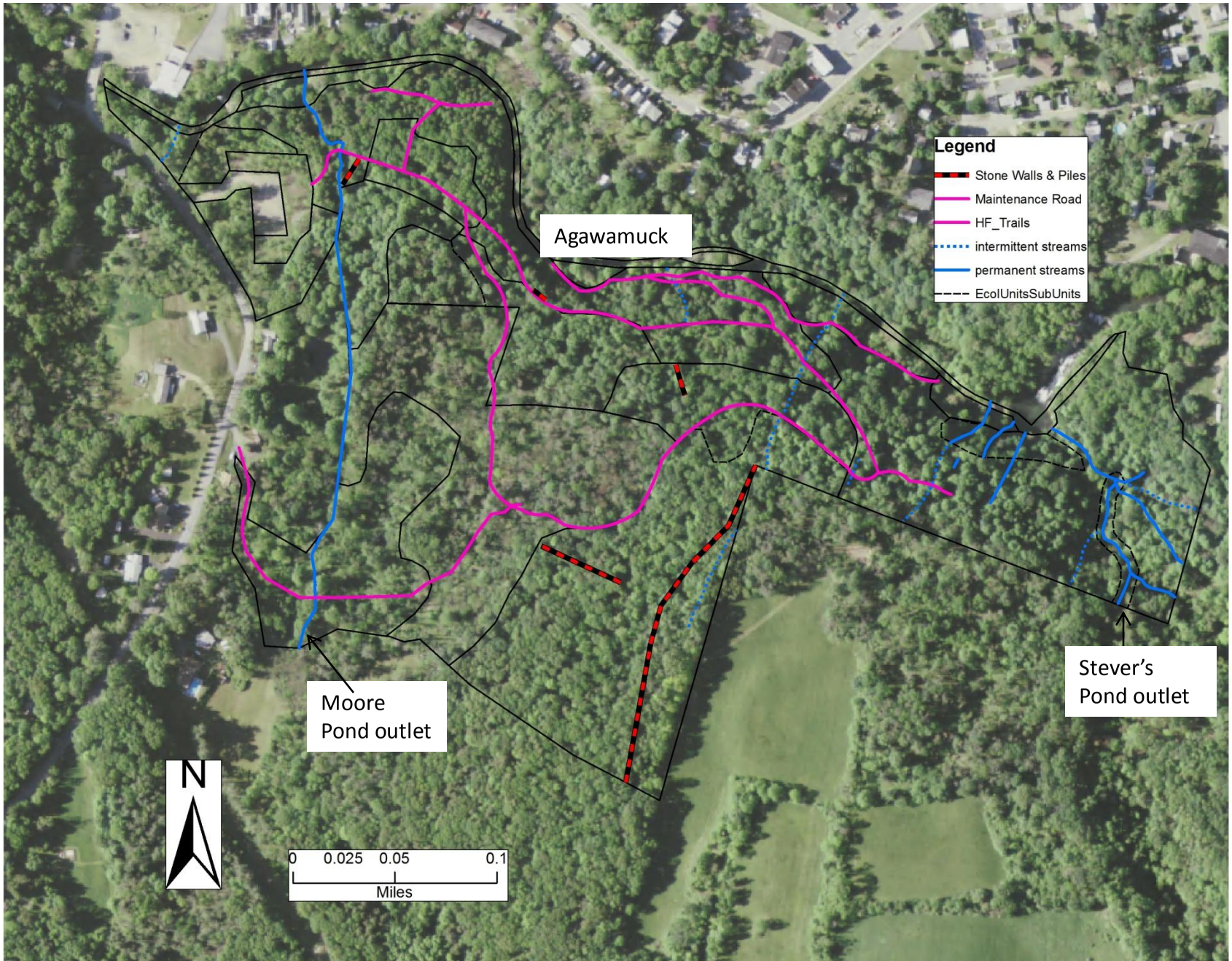
Map 1: Ecological Units (Habitats) at High Falls Conservation Area



Map 2: High Falls Conservation Area overlaid on historical aerial photo (1940s)



Map 3: High Falls Conservation Area overlaid on recent aerial photo (2009)



Map 4: Geology (Surficial and Bedrock) at High Falls Conservation Area

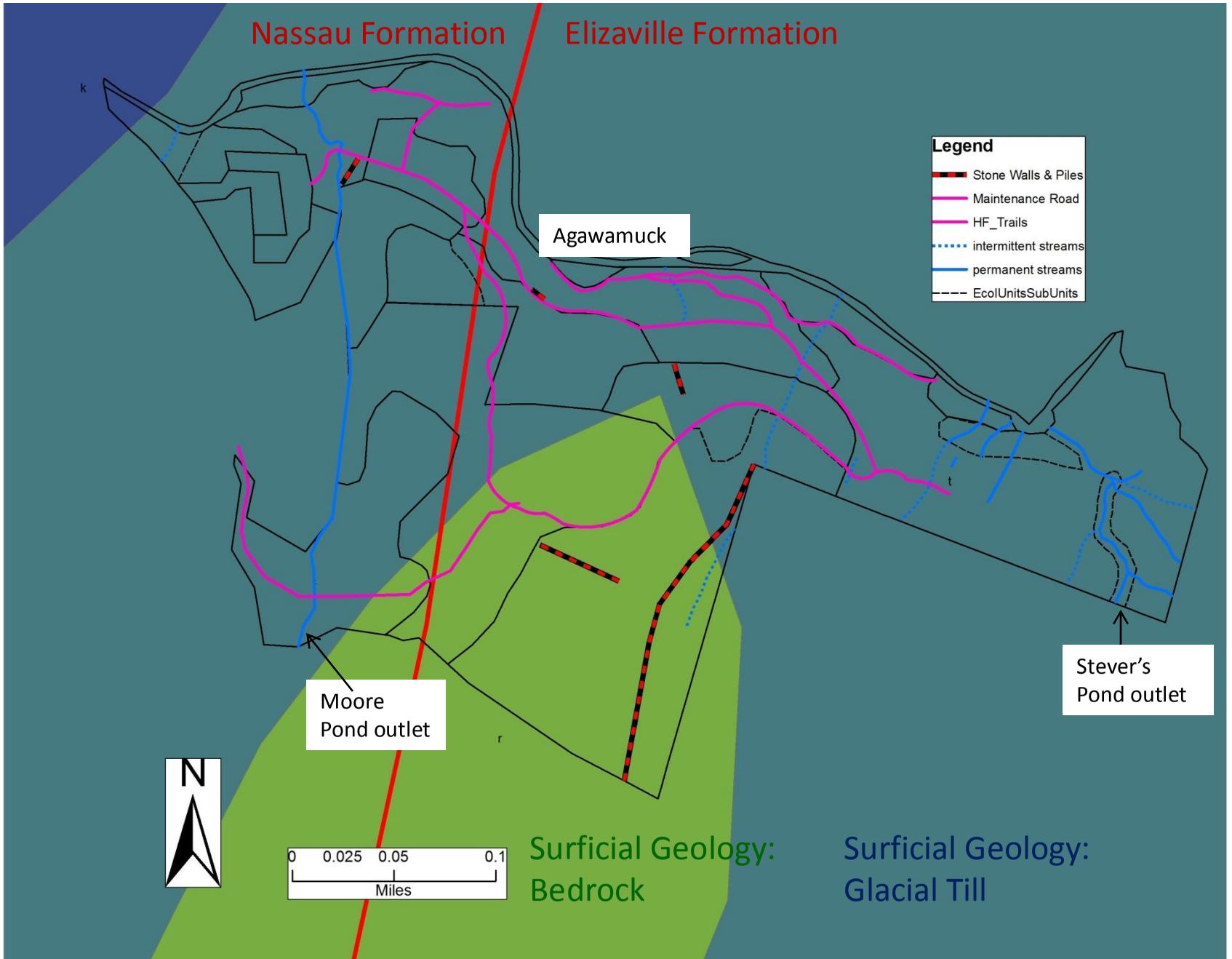


Table 1 (p. 1 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit										
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
	TREES																	
TREES	Aceraceae	Acer negundo var. negundo	box elder	Y						X	X				X			
	Aceraceae	Acer pensylvanicum	striped maple, moosewood, green-striped maple, whistlewood, Pennsylvania maple	Y			X	X	X	X		X	X			X		X
	Aceraceae	Acer platanoides	Norway maple	N	invasive						X		X			X		
	Aceraceae	Acer rubrum var. rubrum	red maple	Y			X	X	X		X	X	X					X
	Aceraceae	Acer saccharinum ?	silver maple	Y			X											
	Aceraceae	Acer saccharum var. saccharum	sugar maple	Y			X	X	X	X	X	X	X			X		X
	Aceraceae	Acer spicatum	mountain maple	Y	cons. int.											X		
	Anacardiaceae	Rhus typhina	staghorn sumac	Y							X				X			
	Betulaceae	Betula alleghaniensis	yellow birch	Y									X			X		
	Betulaceae	Betula lenta	black birch, sweet birch, cherry birch	Y			X	X			X		X			X		X
	Betulaceae	Betula papyrifera	white birch, paper birch, canoe birch	Y														X
	Betulaceae	Carpinus caroliniana ssp. virginiana	musclewood, American hornbeam, blue beech, ironwood	Y			X	X	X				X			X		
	Betulaceae	Ostrya virginiana	hop hornbeam, ironwood	Y			X	X	X			X	X			X		X
	Bignoniaceae	Catalpa speciosa	northern catalpa	N							X							
	Cornaceae	Cornus alternifolia	alternate-leaved dogwood	Y	cons. int.				X									
	Cornaceae	Cornus amomum ssp. amomum	silky dogwood	Y						X								
	Cornaceae	Cornus florida	flowering dogwood	Y	cons. int.		X											
	Cornaceae	Cornus racemosa	gray dogwood	Y									X		X			X
	Cupressaceae	Juniperus virginiana var. virginiana	red cedar, savin	Y							X	X						
	Fabaceae	Robinia pseudoacacia	black locust, false acacia	N	invasive		X	X	X	X	X	X	X		X	X		X
	Fagaceae	Castanea dentata	chestnut, American chestnut	Y	cons. int.											X		
	Fagaceae	Fagus grandifolia	beech, American beech	Y			X									X		
	Fagaceae	Quercus alba	white oak, eastern white oak	Y			X	X	X									
	Fagaceae	Quercus ilicifolia	scrub oak, bear oak	Y				X										
	Fagaceae	Quercus montana	chestnut oak, mountain chestnut oak, rock chestnut oak	Y			X	X	X			X	X			X		
	Fagaceae	Quercus rubra	red oak, northern red oak	Y			X	X	X	X	X	X				X		X
	Hamamelidaceae	Hamamelis virginiana	witch-hazel, American witch-hazel	Y			X	X	X		X		X			X		X
	Hippocastanaceae	Aesculus hippocastanum	horse chestnut	N												X		
	Juglandaceae	Carya cordiformis	bitternut hickory	Y												X		
	Juglandaceae	Carya glabra	pignut hickory, sweet pignut	Y			X	X		X		X	X					X
	Juglandaceae	Carya ovata	shagbark hickory, shellbark hickory	Y			X	X										
	Juglandaceae	Carya sp.		Y				X										X
	Juglandaceae	Juglans nigra	black walnut	Y							X		X			X		X
	Lauraceae	Sassafras albidum	sassafras, ague tree	Y				X					X					
	Magnoliaceae	Liriodendron tulipifera	tulip tree, tulip poplar, yellow poplar	Y									X			X		
	Moraceae	Morus sp.	mulberry	?							X							
	Oleaceae	Fraxinus americana	white ash	Y			X	X	X		X	X	X			X		X
	Oleaceae	Fraxinus sp.		Y			X	X		X			X			X		
	Pinaceae	Picea abies	Norway spruce	N							X							
	Pinaceae	Pinus strobus	white pine, eastern white pine	Y			X			X	X	X						X
	Pinaceae	Tsuga canadensis	hemlock, eastern hemlock	Y			X	X	X				X			X		
	Platanaceae	Platanus occidentalis	sycamore, American plane-tree	Y							X		X	X	X		X	
	Rhamnaceae	Rhamnus cathartica	buckthorn	N	invasive					X						X		
	Rosaceae	Amelanchier arborea var. arborea	downy shadbush, downy serviceberry	Y				X										
	Rosaceae	Amelanchier laevis	smooth shadbush, Allegheny service-berry	Y				X										
	Rosaceae	Amelanchier sp.		Y			X	X	X									
	Rosaceae	Prunus serotina	wild black cherry	Y			X	X	X		X	X	X			X		X
	Rosaceae	Prunus sp.	domestic cherry	N						X								X
	Rosaceae	Prunus virginiana	choke cherry	Y			X	X	X		X					X		
	Salicaceae	Populus deltoides	cottonwood, eastern cottonwood	Y			X			X	X		X		X			

Table 1 (p. 2 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit											
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
TREES	Simaroubaceae	Ailanthus altissima	tree-of-heaven, Chinese sumac, ailanthus, varnish-tree, copa-tree	N	invasive			X		X	X		X		X	X		X
	Tiliaceae	Tilia americana var. americana	basswood, American basswood	Y			X	X	X				X			X		
	Ulmaceae	Ulmus americana	American elm	Y					X	X			X			X		X
	Ulmaceae	Ulmus sp.		Y									X		X	X		
SHRUBS	**SHRUBS**																	
	Berberidaceae	Berberis thunbergii	Japanese barberry	N	invasive			X	X	X	X	X	X			X		X
	Caprifoliaceae	Diervilla lonicera	northern bush-honeysuckle	Y				X								X		
	Caprifoliaceae	Lonicera canadensis	American fly-honeysuckle	Y	cons. int.		X									X		
	Caprifoliaceae	Lonicera morrowii/bella	invasive honeysuckle	N	invasive			X	X	X	X	X	X		X	X		X
	Caprifoliaceae	Sambucus racemosa var. racemosa	red elderberry	Y												X		
	Caprifoliaceae	Sambucus sp.	elderberry	Y				X	X		X					X		X
	Caprifoliaceae	Viburnum acerifolium	mapleleaf viburnum	Y			X	X				X	X			X		
	Elaeagnaceae	Elaeagnus umbellata	autumn olive	N	invasive								X					
	Ericaceae	Gaylussacia baccata	huckleberry, black huckleberry	Y			X											
	Ericaceae	Rhododendron periclymenoides	pink azalea	Y	cons. int.			X								X		
	Ericaceae	Vaccinium angustifolium	lowbush blueberry, low sweet blueberry, late sweet blueberry, sweet-hurts	Y			X	X										
	Ericaceae	Vaccinium pallidum (= V. vacillans)	lowbush blueberry, early lowbush blueberry	Y			X	X										X
	Ericaceae	Vaccinium stamineum	deerberry, squawberry	Y			X	X				X						
	Grossulariaceae	Ribes cynosbati	prickly gooseberry	Y				X				X						X
	Hydrangeaceae	Philadelphus odoratus	mock orange	N												X		
	Lauraceae	Lindera benzoin	spicebush, benzoin-bush, Benjamin-bush, fever-bush, wild allspice	Y					X	X	X		X					X
	Oleaceae	Ligustrum obtusifolium	border privet	N								X						
	Rosaceae	Malus sieboldii	toringa crabapple	N	invasive						X							
	Rosaceae	Rosa multiflora	multiflora rose, rambler rose	N	invasive			X	X		X	X	X		X	X		X
	Rosaceae	Rubus allegheniensis	Allegheny blackberry	Y				X		X	X					X		X
	Rosaceae	Rubus idaeus ssp. strigosus	American red raspberry	Y				X	X	X	X				X	X		X
	Rosaceae	Rubus occidentalis	black raspberry	Y				X	X	X	X	X			X	X		X
	Rosaceae	Rubus odoratus	purple flowering raspberry	Y												X		
	Taxaceae	Taxus canadensis	yew, Canada yew, ground hemlock, American yew	Y	cons. int.											X		
	Thymeliaceae	Dirca palustris	leatherwood, eastern leatherwood	Y	cons. int.								X					
VINES	**VINES**																	
	Anacardiaceae	Toxicodendron radicans ssp. radicans	poison ivy, eastern poison ivy	Y			X	X	X	X	X	X	X		X	X		X
	Celastraceae	Celastrus orbiculatus	Oriental bittersweet	N	invasive						X		X			X		
	Cucurbitaceae	Echinocystis lobata	wild cucumber, prickly cucumber, wild balsam-apple	Y							X							
	Ranunculaceae	Clematis virginiana	virgin-bower, Virginia virgin-bower	Y				X		X								
	Vitaceae	Parthenocissus quinquefolia	Virginia creeper	Y			X	X	X	X	X	X	X			X		X
	Vitaceae	Vitis sp.		Y				X	X	X	X		X		X	X		X
HERBACEOUS PLANTS	**HERBACEOUS PLANTS**																	
	Apiaceae	Cryptotaenia canadensis	Canada honewort	Y							X					X		X
	Apiaceae	Daucus carota	wild carrot	N											X			
	Apiaceae	Sanicula sp.	black snake-root	Y				X										
	Apiaceae	Torilis japonica	hedge-parsley, erect hedge-parsley	N									X					
	Apocynaceae	Apocynum cannabinum	Indian hemp, clasping-leaved dogbane	Y									X					
	Araceae	Arisaema triphyllum ssp. triphyllum	common jack-in-the-pulpit	Y			X	X	X	X	X	X	X			X		X
	Araliaceae	Aralia nudicaulis	wild sarsaparilla	Y			X	X					X			X		
	Araliaceae	Aralia racemosa ssp. racemosa	American spikenard	Y	cons. int.											X		

Table 1 (p. 3 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit										
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
HERBACEOUS PLANTS	Aristolochiaceae	Asarum canadense	wild ginger, asarabacca	Y												X		
	Asclepiadaceae	Asclepias syriaca	common milkweed, Kansas milkweed, silkweed	Y											X			
	Asteraceae	Ageratina altissima var. altissima (= Eupatorium rugosum)	white snakeroot	Y			X	X	X	X	X	X	X		X	X		X
	Asteraceae	Antennaria plantaginifolia	plantain-leaf pussytoes, woman's tobacco	Y				X										
	Asteraceae	Artemisia vulgaris var. vulgaris	mugwort	N	invasive										X			
	Asteraceae	Aster sp.		Y					X			X						X
	Asteraceae	Bidens sp		?												X		
	Asteraceae	Centaurea stoebe ssp. micranthos (= C. maculosa)	spotted knapweed, spotted starthistle	N	invasive										X			
	Asteraceae	Conyza canadensis var. canadensis	horseweed, Canadian horseweed	Y											X			
	Asteraceae	Erigeron annuus	annual fleabane, white-top fleabane, Easter daisy fleabane	Y						X					X			
	Asteraceae	Eurybia divaricata (= Aster divaricata)	white wood-aster	Y			X	X	X		X	X	X			X		X
	Asteraceae	Eurybia schreberi (= Aster schreberi)	Schreber's aster	Y			X	X										
	Asteraceae	Euthamia graminifolia (= Solidago graminifolia)	grass-leaved goldenrod, flat-top fragrant goldenrod	Y				X		X					X			
	Asteraceae	Eutrochium maculatum var. maculatum (= Eupatorium maculatum)	spotted Joe-Pye weed	Y									X					
	Asteraceae	Eutrochium purpureum var. purpureum (= Eupatorium purpureum)	sweetscented Joe-Pye weed	Y									X					
	Asteraceae	Hieracium paniculatum	panicled hawkweed	Y			X											
	Asteraceae	Hieracium sp.	hawkweed	N				X										
	Asteraceae	Hieracium venosum	rattlesnake hawkweed	Y								X						
	Asteraceae	Leucanthemum vulgare (= Chrysanthemum leucanthemum)	oxeye daisy	N											X			
	Asteraceae	Prenanthes sp.		Y			X	X	X				X			X		X
	Asteraceae	Rudbeckia sp		Y									X					
	Asteraceae	Solidago altissima	Canada goldenrod (broadly defined), tall goldenrod	Y											X			
	Asteraceae	Solidago arguta var. arguta	forest goldenrod, cutleaf goldenrod	Y				X	X			X				X		
	Asteraceae	Solidago caesia var. caesia	bluestem goldenrod, wreath goldenrod	Y			X	X	X		X	X	X			X		
	Asteraceae	Solidago flexicaulis	zig-zag goldenrod, broad-leaved goldenrod	Y									X			X		
	Asteraceae	Solidago gigantea	smooth goldenrod, giant goldenrod	Y						X	X				X			
	Asteraceae	Solidago juncea	early goldenrod	Y											X			
	Asteraceae	Solidago nemoralis ssp. nemoralis	gray goldenrod, old-field goldenrod, field goldenrod, dyersweed goldenrod	Y							X				X			
	Asteraceae	Solidago rugosa var. rugosa	wrinkle-leaved goldenrod, rough-stemmed goldenrod, tall hairy goldenrod, butterweed	Y				X	X	X	X	X			X			X
	Asteraceae	Symphyotrichum ericoides var. ericoides	heath aster, white heath aster	Y											X			
	Asteraceae	Symphyotrichum cordifolium (= Aster cordifolius)	blue wood aster	Y							X							
	Asteraceae	Symphyotrichum lanceolatum var. lanceolatum (= Aster lanceolatus)	white panicle aster	Y						X							X	
	Asteraceae	Symphyotrichum lateriflorum (= Aster lateriflorus)	calico aster, small white aster	Y			X			X		X	X			X		
	Asteraceae	Symphyotrichum novae-angliae (= Aster novae-angliae)	New England aster	Y											X			
	Asteraceae	Symphyotrichum sp.	aster	Y														X

Table 1 (p. 4 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit											
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
HERBACEOUS PLANTS	Asteraceae	Taraxacum officinale	dandelion, common dandelion	N											X			
	Balsaminaceae	Impatiens capensis	orange jewelweed, spotted jewelweed, touch-me-not, snapweed	Y			X	X		X	X		X			X		
	Balsaminaceae	Impatiens pallida	yellow jewelweed, pale jewelweed	Y	cons. int.								X			X		
	Berberidaceae	Caulophyllum thalictroides	blue cohosh, squaw-root, papoose-root	Y	cons. int.			X	X	X			X			X		
	Boraginaceae	Hackelia virginiana	Virginia stickseed, beggarslice	Y					X	X	X		X					X
	Brassicaceae	Alliaria petiolata	garlic mustard	N	invasive		X	X	X	X	X	X	X		X	X		X
	Brassicaceae	Barbarea vulgaris	wintercress, yellow rocket	N												X		
	Brassicaceae	Boechera laevigata (= Arabis laevigata)	smooth rock-cress	Y				X								X		
	Brassicaceae	Cardamine diphylla	broad-leaved toothwor, two-leaf toothwort	Y					X				X			X		
	Brassicaceae	Cardamine parviflora var. arenicola	small-flower bitter-cress	Y	cons. int.			X										
	Brassicaceae	Cardamine pensylvanica	Pennyslvania bittercress	Y													X	
	Brassicaceae	Hesperis matronalis	dame's-rocket, mother-of-the-evening, dame's-violet	N	invasive					X			X					
	Campanulaceae	Triodanis perfoliata	clasping Venus' looking-glass	Y											X			
	Caryophyllaceae	Dianthus armeria ssp. armeria	Deptford pink	N											X			
	Caryophyllaceae	Paronychia canadensis	forked-chickweed, forked nail-wort, smooth-forked nailwort	Y				X				X						
	Caryophyllaceae	Saponaria officinalis	bouncing-bet	N											X			
	Caryophyllaceae	Silene vulgaris (= Silene cucubalus)	bladder campion, maiden's tears	N											X			
	Caryophyllaceae	Stellaria media ssp. media	common chickweed	N			X	X		X	X							X
	Clusiaceae	Hypericum perforatum	common St. John's-wort	N						X		X			X	X		
	Clusiaceae	Hypericum punctatum	spotted St. John's-wort	Y												X		
	Crassulaceae	Sedum acre	gold-moss	N													X	
	Cyperaceae	Carex conoidea	openfield sedge	Y				X		X								
	Ericaceae	Gaultheria procumbens	wintergreen, teaberry	Y			X											
	Ericaceae	Monotropa uniflora	Indian-pipe	Y			X					X	X					
	Euphorbiaceae	Acalypha virginica	three-seeded mercury	Y								X						
	Fabaceae	Amphicarpaea bracteata	hogpeanut, American hogpeanut	Y				X					X			X		
	Fabaceae	Lotus corniculatus	bird's-foot trefoil	N											X			
	Fabaceae	Melilotus officinalis	yellow sweetclover	N											X			
	Fabaceae	Trifolium repens	white clover	N											X			
	Fumariaceae	Dicentra cucullaria	Dutchman's breeches	Y	cons. int.											X		
	Geraniaceae	Geranium maculatum	wild geranium, wild crane's-bill	Y												X		
	Geraniaceae	Geranium robertianum	herb-Robert, Robert's geranium	Y												X	X	
	Lamiaceae	Collinsonia canadensis	horse-balm, Canada horse-balm	Y			X	X					X			X		
	Lamiaceae	Galeopsis tetrahit var. tetrahit	hempnettle, brittlestem hempnettle	N						X	X		X					
	Lamiaceae	Glechoma hederacea (= Nepeta hederacea)	ground ivy	N			X			X	X				X			X
	Lamiaceae	Hedeoma pulegioides	American pennyroyal	Y								X						
	Lamiaceae	Monarda fistulosa var. fistulosa	wild bergamot bee-balm	Y						X								
	Liliaceae	Allium tricoccum var. tricoccum	wild leek, small white leek, ramp	Y									X					
	Liliaceae	Allium vineale	field garlic, wild garlic	N	invasive		X	X	X	X	X					X		X
	Liliaceae	Erythronium americanum ssp. americanum	trout-lily, yellow trout-lily	Y			X	X	X				X			X		
	Liliaceae	Hemerocallis fulva	orange daylily, tawny daylily	N	invasive												X	
	Liliaceae	Maianthemum canadense	Canada May-flower, Canadian May-lily, wild lily-of-the-valley, false lily-of-the-valley, two-leaved Solomon's-seal	Y			X	X	X		X					X		X
	Liliaceae	Maianthemum racemosum ssp. racemosum (= Smilacina racemosa)	false Solomon's-seal, false spikenard, Solomon's-plume	Y			X		X	X	X		X			X		X

Table 1 (p. 5 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit											
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
HERBACEOUS PLANTS	Liliaceae	Polygonatum pubescens	downy Solomon's-seal, hairy Solomon's seal	Y			X	X	X			X	X			X		X
	Liliaceae	Trillium erectum	red trillium, wake robin, stinking Benjamin, stinking Willie, birthwort, ill-scent trillium	Y			X	X	X				X			X		
	Liliaceae	Uvularia perfoliata	perfoliate bellwort	Y								X						
	Liliaceae	Uvularia sessilifolia	sessile-leaved bellwort, wild-oats, straw-lily	Y									X					
	Limnanthaceae	Floerkea proserpinacoides	false mermaid-weed	Y	cons. int.								X					
	Onagraceae	Circaea lutetiana ssp. canadensis	common enchanter's nightshade	Y			X	X	X	X	X	X	X			X		X
	Orchidaceae	Epipactis helleborine	helleborine, eastern helleborine, broad-leaved helleborine	N			X	X	X				X			X		
	Orobranchaceae	Epifagus virginiana	beechdrops	Y												X		
	Oxalidaceae	Oxalis stricta	yellow wood-sorrel, upright yellow wood-sorrel	Y				X		X	X	X	X		X	X		X
	Papaveraceae	Chelidonium majus	celandine, greater celandine	N			X	X		X	X		X					X
	Papaveraceae	Sanguinaria canadensis	bloodroot	Y	cons. int.				X							X		
	Phytolaccaceae	Phytolacca americana var. americana	pokeweed, common pokeweed, pokeweed, poke, pokeberry	Y							X							
	Plantaginaceae	Plantago major	broad-leaved plantain, nipple-seed plantain	N						X								
	Poaceae	Cinna arundinacea	sweet woodreed, wood reedgrass, stout woodreed	Y									X					
	Poaceae	Poa palustris	fowl bluegrass, meadowgrass	Y									X					X
	Polygalaceae	Polygala paucifolia	gay-wing milkwort	Y				X										
	Polygonaceae	Fallopia convolvulus (= Polygonum convolvulus)	black bindweed	N						X								
	Polygonaceae	Fallopia scandens var. scandens (= Polygonum scandens)	climbing false buckwheat	Y											X			
	Polygonaceae	Persicaria hydropiper (= Polygonum hydropiper)	water-pepper, marshpepper smartweed	N						X								
	Polygonaceae	Persicaria longiseta (= Polygonum caespitosum)	creeping smartweed, bristly lady's-thumb	N				X		X	X	X				X		
	Polygonaceae	Persicaria maculosa (= Polygonum persicaria)	lady's-thumb, spotted lady's-thumb, redshank, heart's-ease, smartweed	N							X							
	Polygonaceae	Persicaria virginiana (= Polygonum virginianum)	jumpseed	Y						X	X							
	Polygonaceae	Polygonum cuspidatum	Japanese knotweed	N	invasive		X						X	X				
	Polygonaceae	Rumex crispus	curly dock, yellow dock, sour dock	N						X								
	Polygonaceae	Rumex obtusifolius	broad-leaf dock, broadleaf dock, bitter dock	N						X	X							
	Primulaceae	Lysimachia ciliata	fringed loosestrife	Y														
	Primulaceae	Lysimachia quadrifolia	whorled loosestrife	Y				X										
	Primulaceae	Trientalis borealis	starflower, northern starflower	Y			X	X										
	Ranunculaceae	Actaea pachypoda (= Actaea alba)	white baneberry, doll's-eyes	Y												X		X
	Ranunculaceae	Actaea rubra	red baneberry	Y	cons. int.			X		X						X		
	Ranunculaceae	Anemone quinquefolia var. quinquefolia	wood anemone, nightcaps	Y				X					X					
	Ranunculaceae	Aquilegia canadensis	wild columbine, Canadian columbine	Y				X								X		
	Ranunculaceae	Hepatica nobilis var. obtusa (= Hepatica americana)	round-lobed hepatica, round-leaved liverleaf	Y				X										
	Ranunculaceae	Ranunculus abortivus	kidney-leaved buttercup, kidney-leaved crowfoot, littleleaf buttercup	Y			X	X	X	X	X		X			X		
	Ranunculaceae	Ranunculus recurvatus var. recurvatus	hooked buttercup, hooked crowfoot	Y						X	X		X			X	X	
	Ranunculaceae	Ranunculus sp		?				X		X								
	Ranunculaceae	Thalictrum dioicum	early meadow-rue, quicksilver-weed	Y			X						X			X		

Table 1 (p. 6 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit										
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
HERBACEOUS PLANTS	Ranunculaceae	Thalictrum pubescens (= Thalictrum polygamum)	tall meadow-rue, late meadow-rue, meadow-weed, muskrat-weed, king-of-the-meadow	Y									X				X	
	Ranunculaceae	Thalictrum sp.	meadow-rue	Y									X			X		
	Ranunculaceae	Thalictrum thalictroides (= Anemonella thalictroides)	rue-anemone, windflower	Y			X	X								X		
	Rosaceae	Fragaria virginiana	wild strawberry, Virginia strawberry	Y											X			
	Rosaceae	Geum canadense	white avens	Y			X	X		X	X				X	X		X
	Rosaceae	Potentilla recta	sulphur cinquefoil	N											X			
	Rosaceae	Potentilla simplex	common cinquefoil, old-field cinquefoil	Y				X		X					X	X		X
	Rubiaceae	Galium aparine	cleavers	Y			X	X			X		X					
	Rubiaceae	Galium asprellum	rough bedstraw	Y									X					X
	Rubiaceae	Galium circaezans var. circaezans	licorice bedstraw	Y				X				X						
	Rubiaceae	Galium mollugo	common bedstraw, white bedstraw, wild madder	N											X			
	Rubiaceae	Galium sp.	unidentified bedstraws	?									X					X
	Rubiaceae	Galium triflorum	fragrant bedstraw, sweet-scented bedstraw	Y						X						X		X
	Rubiaceae	Mitchella repens	partridgeberry	Y			X	X	X									
	Santalaceae	Comandra umbellata ssp. umbellata	bastard toadflax	Y			X											
	Saxifragaceae	Mitella diphylla	miterwort, twoleaf miterwort, coolwort	Y												X		
	Saxifragaceae	Saxifraga virginiensis	early saxifrage, Virginia saxifrage	Y				X								X		
	Saxifragaceae	Tiarella cordifolia	foam-flower, heart-leaved foam-flower	Y			X	X	X	X	X					X		X
	Scrophulariaceae	Melampyrum lineare var. latifolium	cow-wheat, narrowleaf cow-wheat	Y			X	X										
	Scrophulariaceae	Verbascum thapsus	great mullein	N											X			
	Scrophulariaceae	Veronica officinalis	common speedwell, gypsy-weed	N				X		X		X				X		
	Scrophulariaceae	Veronica peregrina ssp. peregrina	neckweed	Y						X								
	Solanaceae	Solanum carolinense var. carolinense	horsenettle, Carolina horsenettle	Y									X					
	Urticaceae	Laportea canadensis	wood nettle	Y									X			X		
	Urticaceae	Pilea pumila	clearweed, Canada clearweed, cool-wort, richweed,	Y							X					X		X
	Urticaceae	Urtica dioica	stinging nettle	?														X
	Verbenaceae	Verbena urticifolia var. urticifolia	white vervain	Y						X								
	Violaceae	Viola blanda	sweet white violet	Y												X		
	Violaceae	Viola cucullata	marsh blue violet	Y													X	
	Violaceae	Viola palmata/subsinuata	early blue violet	Y				X								X		
	Violaceae	Viola pubescens var. pubescens	downy yellow violet	Y			X			X						X		X
	Violaceae	Viola rostrata	long-spur violet	Y			X		X				X			X		
	Violaceae	Viola rotundifolia?	roundleaf violet	Y	cons. int.			X										
	Violaceae	Viola sagittata var. sagittata	arrow-leaved violet	Y	cons. int.			X										
	Violaceae	Viola sororia (incl. Viola papilionaceae)	common violet	Y			X	X	X	X	X		X			X		X
	Violaceae	Viola sp.	violet	Y				X										X
GRAMINOIDS	**GRAMINOIDS**																	
	Cyperaceae	Carex appalachica	Appalachian sedge	Y			X		X									
	Cyperaceae	Carex argyrantha	hay sedge, silvery-flowered sedge	Y	cons. int.				X			X						
	Cyperaceae	Carex blanda	charming woodland sedge, woodland sedge	Y				X					X					
	Cyperaceae	Carex cephalophora	oval-leaved sedge	Y				X			X	X						X
	Cyperaceae	Carex crinita var. crinita	fringed sedge	Y														X
	Cyperaceae	Carex digitalis var. digitalis	slender woodland sedge	Y									X					
	Cyperaceae	Carex gracillima	graceful sedge	Y				X	X	X	X					X		
	Cyperaceae	Carex hirsutella (= Carex complanatum var. hirsuta)	hirsute sedge	Y								X	X		X			X
	Cyperaceae	Carex laxiculmis var. laxiculmis	spreading sedge	Y														
	Cyperaceae	Carex laxiflora	broad looseflower sedge	Y			X	X	X			X	X			X		

Table 1 (p. 7 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit											
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
GRAMINOIDS	Cyperaceae	Carex leptonervia	finely-nerved sedge	Y						X								X
	Cyperaceae	Carex normalis	greater straw sedge	Y						X					X			
	Cyperaceae	Carex pensylvanica	Pennsylvania sedge	Y			X	X	X	X		X			X	X		
	Cyperaceae	Carex plantaginea?	plantain-leaved sedge	Y	cons. int.			X										
	Cyperaceae	Carex platyphylla	broad-leaved sedge	Y			X	X					X			X		
	Cyperaceae	Carex prasina	drooping sedge	Y												X		
	Cyperaceae	Carex radiata	stellate sedge	Y				X			X	X				X		X
	Cyperaceae	Carex rosea	rosy sedge	Y				X		X	X					X		X
	Cyperaceae	Carex rosea/radiata	sedge	Y							X							
	Cyperaceae	Carex scoparia var. scoparia	broom sedge	Y				X				X						
	Cyperaceae	Carex sparganioides	bur-reed sedge	Y				X			X					X		
	Cyperaceae	Carex spp.	unidentified sedges	Y			X	X	X	X			X					X
	Cyperaceae	Carex stricta	tussock sedge	Y									X	X			X	
	Cyperaceae	Carex swanii	swan sedge	Y			X		X		X							X
	Cyperaceae	Carex vulpinoidea	fox sedge	Y							X							
	Cyperaceae	Trichophorum planifolium (= Scirpus verecundus)	bashful bulrush	Y				X										
	Juncaceae	Juncus tenuis	path rush, slender rush	Y						X								
	Poaceae	Agrostis gigantea (= Agrostis alba)	redtop, black bentgrass	N											X			
	Poaceae	Agrostis hyemalis	southern hairgrass, southern ticklegrass, winter bentgrass	Y					X	X								
	Poaceae	Anthoxanthum odoratum	sweet vernal grass	N								X			X			
	Poaceae	Avenella flexuosa (= Deschampsia flexuosa)	wavy hair grass	Y														X
	Poaceae	Bromus inermis	awnless brome	N											X			
	Poaceae	Dactylis glomerata	orchard grass	N							X				X			
	Poaceae	Danthonia spicata	poverty oatgrass	Y			X	X			X	X			X	X		
	Poaceae	Dichanthelium acuminatum ssp. fasciculatum (= Panicum lanuginosum)	panic grass	Y				X			X	X	X		X	X		
	Poaceae	Dichanthelium clandestinum (= Panicum clandestinum)	deer-tongue witchgrass	Y							X		X		X			
	Poaceae	Dichanthelium dichotomum ssp. dichotomum (= Panicum dichotomum)	small-fruited panicgrass	Y								X						
	Poaceae	Dichanthelium latifolium (= Panicum latifolium)	broad-leaf witchgrass	Y	cons. int.			X										
	Poaceae	Elymus repens (= Agropyron/Elytrigia repens)	quackgrass	N											X			
	Poaceae	Elymus riparius	river wild-rye	Y						X								
	Poaceae	Eragrostis spectabilis	purple lovegrass	Y											X			
	Poaceae	Festuca trachyphylla	hard fescue, sheep fescue	N											X			
	Poaceae	Glyceria striata	fowl manna grass	Y						X	X					X		X
	Poaceae	Leersia virginica	white grass, Virginia cutgrass	Y				X			X		X			X		
	Poaceae	Microstegium vimineum	Japanese stiltgrass, eulalia	N	invasive				X	X	X	X	X		X	X		X
	Poaceae	Muhlenbergia mexicana	Mexican muhly	Y								X						
	Poaceae	Muhlenbergia schreberi	Schreber muhly	Y						X					X			
	Poaceae	Muhlenbergia sobolifera	cliff muhly	Y							X							
	Poaceae	Muhlenbergia sp.	muhly grass	?							X	X						
	Poaceae	Muhlenbergia tenuiflora	slender muhly	Y									X					
	Poaceae	Oryzopsis asperifolia	white-grained mountain-ricegrass	Y				X	X						X			
	Poaceae	Phalaris arundinacea	reed canary grass	Y									X					
	Poaceae	Phleum pratense ssp. pratense	timothy, meadow timothy	N											X			
	Poaceae	Poa alsodes	grove bluegrass	Y						X								
	Poaceae	Poa compressa	Canada bluegrass	N						X								
	Poaceae	Poa pratensis ssp. pratensis	Kentucky bluegrass	N						X					X			
	Poaceae	Poa trivialis ssp. trivialis	rough-sheathed bluegrass, Scribner bluegrass	N														X
	Poaceae	Setaria glauca/geniculate	foxtail	N											X			
	Poaceae	Sphenopholis sp.?	wedgegrass	Y														X
	Poaceae	spp.	unidentified grass species	?				X	X				X			X		X
	FERNS																	
	Aspleniaceae	Asplenium platyneuron var. platyneuron	ebony spleenwort	Y				X				X						

Table 1 (p. 8 of 8): **Vascular Plants of High Falls Conservation Area** (Hawthorne Valley Farmscape Ecology Program 2013)

							Ecological Unit											
				native (Y/N)	conservation concern		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
FERNS	Aspleniaceae	Asplenium trichomanes ssp. trichomanes	maidenhair spleenwort	Y	cons. int.											X		
	Dennstaedtiaceae	Dennstaedtia punctilobula	eastern hay-scented fern	Y			X	X	X		X		X			X		X
	Dennstaedtiaceae	Pteridium aquilinum var. latiusculum	eastern bracken, bracken fern	Y			X	X										
	Dryopteridaceae	Dryopteris carthusiana (= Dryopteris spinulosa)	spinulose wood fern, spinulose shield fern, toothed wood fern	Y				X	X	X	X					X		X
	Dryopteridaceae	Dryopteris intermedia ssp. intermedia	evergreen woodfern	Y			X	X	X	X	X		X			X		X
	Dryopteridaceae	Dryopteris marginalis	marginal wood fern	Y			X	X	X				X			X		X
	Dryopteridaceae	Polystichum acrostichoides	Christmas fern	Y			X	X	X		X		X			X		X
	Onocleaceae	Matteuccia struthiopteris	ostrich fern	Y	cons. int.						X							
	Onocleaceae	Onoclea sensibilis	sensitive fern	Y			X	X		X	X					X		X
	Osmundaceae	Osmunda claytoniana	interrupted fern	Y			X						X					
	Polypodiaceae	Polypodium virginianum	rock polypody	Y			X	X					X			X		
	Thelypteridaceae	Phegopteris connectilis (= Thelypteris phegopteris = Dryopteris phegopteris)	northern beech fern	Y	cons. int.													X
	Thelypteridaceae	Thelypteris noveboracensis (= Dryopteris noveboracensis)	New York fern	Y			X		X				X			X		X
	Woodsiaceae	Athyrium filix-femina ssp. angustum	lady fern	Y			X		X	X	X		X			X		X
	Woodsiaceae	Cystopteris bulbifera	bulblet fern	Y												X		
	Woodsiaceae	Deparia acrostichoides (=Athyrium thelypteroides)	silvery spleenwort	Y	cons. int.					X								

Table 2: Summary of Floristic Characteristics of the Habitat Units in High Falls Conservation Area

		Ecological Units									
	Vascular Plants	"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Successional Mixed Forest
Number of Plant Species	total	88	129	72	87	92	59	111	67	132	86
	native	80	114	63	62	69	47	93	36	112	71
	of conservation interest	2	8	4	3	1	1	4	0	12	1
	unique species of conservation interest	1	5	1	1	1	0	2	0	6	1
	non native	8	13	8	24	21	11	16	31	18	13
	invasive	4	7	7	9	11	6	12	8	11	8
Percentage of Plant Species	native	91%	88%	88%	71%	75%	80%	84%	54%	85%	83%
	cons interest	2%	6%	6%	3%	1%	2%	4%	0%	9%	1%
	non native	9%	10%	11%	28%	23%	19%	14%	46%	14%	15%
	invasive	5%	5%	10%	10%	12%	10%	11%	12%	8%	9%

Table 3: Plant Species of Conservation Interest Observed at High Falls Conservation Area (in order of frequency)

		Ecological Units												
Common Name	Scientific Name	"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest	Conservation Interest [1)] Kiviat & Stevens 2001 [2)] FEP unpublished
blue cohosh, squaw-root, papoose-root	Caulophyllum thalictroides		X	X	X			X			X			regionally scarce[1)]
red baneberry	Actaea rubra		X		X						X			regionally scarce[1)]
American fly-honeysuckle	Lonicera canadensis	X									X			regionally rare[1)]
bloodroot	Sanguinaria canadensis			X							X			uncommon in Columbia County[2)]
hay sedge, silvery-flowered sedge	Carex argyrantha			X			X							uncommon in Columbia County[2)]
pink azalea	Rhododendron periclymenoides		X								X			regionally scarce?[1)]
yellow jewelweed, pale jewelweed	Impatiens pallida							X			X			uncommon in Columbia County[2)]
alternate-leaved dogwood	Cornus alternifolia			X										regionally scarce?[1)]
American spikenard	Aralia racemosa ssp. racemosa										X			regionally rare[1)]
arrow-leaved violet	Viola sagittata var. sagittata		X											uncommon in Columbia County[2)]
broad-leaf witchgrass	Dichanthelium latifolium		X											uncommon in Columbia County[2)]
chestnut, American chestnut	Castanea dentata										X			uncommon in Columbia County[2)]
Dutchman's breeches	Dicentra cucullaria										X			regionally scarce?[1)]
false mermaid-weed	Floerkea proserpinacoides							X						regionally rare[1)]
flowering dogwood	Cornus florida	X												uncommon in Columbia County[2)]
leatherwood, eastern leatherwood	Dirca palustris							X						regionally rare[1)]
maidenhair spleenwort	Asplenium trichomanes ssp. trichomanes										X			uncommon in Columbia County[2)]
mountain maple	Acer spicatum										X			regionally scarce[1)]
northern beech fern	Phegopteris connectilis												X	regionally rare[1)]
ostrich fern	Matteuccia struthiopteris					X								regionally scarce?[1)]
plantain-leaved sedge	Carex plantaginea?		X											regionally rare[1)]
roundleaf violet	Viola rotundifolia?		X											regionally rare?[1)]
silvery spleenwort	Deparia acrostichoides				X									regionally rare[1)]
small-flower bitter-cress	Cardamine parviflora var. arenicola		X											regionally scarce[1)]
yew, Canada yew, ground hemlock, American yew	Taxus canadensis										X			regionally scarce[1)]

Table 4: Invasive Plants Observed at High Falls Conservation Area (presented in order of frequency)

		Ecological Units											
Common Name	Scientific Name	"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Gravelly Island (partial inventory)	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus	Rocky Creekbed (partial inventory)	Successional Mixed Forest
garlic mustard	Alliaria petiolata	X	X	X	X	X	X	X		X	X		X
black locust, false acacia	Robinia pseudoacacia	X	X	X	X	X	X	X		X	X		X
invasive honeysuckle	Lonicera morrowii/bella		X	X	X	X	X	X		X	X		X
Japanese barberry	Berberis thunbergii		X	X	X	X	X	X			X		X
Japanese stiltgrass, eulalia	Microstegium vimineum			X	X	X	X	X		X	X		X
multiflora rose, rambler rose	Rosa multiflora		X	X		X	X	X		X	X		X
tree-of-heaven, Chinese sumac,	Ailanthus altissima		X	X	X	X		X		X	X		X
field garlic, wild garlic	Allium vineale	X	X	X	X	X					X		X
Norway maple	Acer platanoides					X		X			X		
dame's-rocket, mother-of-the-	Hesperis matronalis				X			X					
Japanese knotweed	Polygonum cuspidatum	X						X	X				
Oriental bittersweet	Celastrus orbiculatus					X		X			X		
buckthorn	Rhamnus cathartica				X						X		
autumn olive	Elaeagnus umbellata							X					
mugwort	Artemisia vulgaris var. vulgaris									X			
orange daylily, tawny daylily	Hemerocallis fulva											X	
spotted knapweed, spotted starthistle	Centaurea stoebe ssp. micranthos									X			
toringa crabapple	Malus sieboldii					X							

Table 5: Ground Beetles of High Falls

Species		Ecological Affinity	Ecological Units										
			"Ancient" Hemlock-dominated Forest exlusively found in clearing[1]	"Ancient" Mixed Forest	"Ancient" Sugar Maple-dominated Forest including permanent stream (Moore Pond outlet)	Early Succesional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus exclusively in seeps and/or along streams[2]	Successional Mixed Forest
Platynus	cf decentis	deciduous forest			x							
Trichotichnus	vulpeculus	deciduous forest					x					
Amphasia	interstitialis	deciduous forest		x								x
Pterostychus	coracinus	various forests									x	x
Trichotichnus	autumnalis	various forests			x			x				
Notiophilus	aeneus	various forests						x				
Pterostychus	adoxus	various forests		x								
Pterostychus	rostratus	various forests	x	x			x				x	x
Pterostychus	tristis	various forests	x[1]	x			x	x			x	x
Harpalus	somnulentis	edges	x									
Pterostychus	mutus	edges	x[1]				x					
Amara	familiaris EX	openings					x					
Carabus	nemoralis EX	openings	x[1]									
Harpalus	rufipes EX	openings					x					
Poecilus	lucublandus	openings				x						
Pterostychus	stygicus	general				x		x				
Agonum	ferreum	moist forest							x			
Anisodatylus	harrisii	moist forest				x			x			
Platynus	tenuicollis	moist forest		x	x						x[2]	
Pterostychus	diligendus	moist forest			x				x			
Bembidion	lacunarium	stream banks			x							
Bembidion	planum	stream banks							x			
Bembidion	semistriatum	stream banks			x				x			
Chlaenius	aestivus	stream banks							x		x[2]	
Nebria	pallipes	stream banks			x				x		x[2]	
Agonum	cf fidele	wet meadows, etc										
Agonum	extensicolle	wet meadows, etc							x			
Bembidion	occultator	wet meadows, etc										
Elaphropus	anceps	wet meadows, etc										
Elaphrus	californicus	wet meadows, etc			x					x		
Pterostychus	corvinus	wet meadows, etc			x							
Stenolophus	ochreopezus	wet meadows, etc				x						
Bembidion	cf grapii	?			x							
Harpalus	cf indigens	?		x								

Table 6: Ants of High Falls

Species		Ecological Affinity	Ecological Unit: "Ancient" Hemlock-dominated Forest [1] exclusively found in clearing	"Ancient" Mixed Forest	"Ancient" Sugar Maple-dominated Forest including permanent stream (Moore Pond outlet)	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Meadow	Rich Mixed Forest, incl. Ravines & Ledge/Talus [2] exclusively found in intermittent stream	Successional Mixed Forest
Aphaenogaster	fulva	forests	X	X			X	X	X		X	X
Aphaenogaster	picea	forests	X	X	X	X	X	X			X	X
Aphaenogaster	rudis	forests									X	X
Aphaenogaster	cf. fulva	forests									X	
Brachymyrmex	depilis	forests	X[1]									
Camponotus	nearcticus	forests	X[1]			X						
Lasius	alienus	forests		X		X	X	X	X		X	X
Lasius	claviger	forests		X				X	X		X	X
QUEEN cf. Lasius	cf. alienus	forests		X					X			
Myrmecina	americana	forests									X[2]	X
Myrmica	detritinodis	forests		X								
Myrmica	nearctica	forests				X						
Myrmica	punctiventris	forests				X		X			X[2]	X
Myrmica	sculptilis	forests		X								
Stigmatomma	pallipes	forests						X				
Temnothorax	longispinosus	forests	X[1]								X[2]	
Formica	neogagates	rich moist forests	X	X				X				X
Formica	subaenescens	moist forests	X									
Lasius	nearcticus	moist forests	X[1]	X		X			X		X[2]	X
Lasius	umbratus	moist open forests/edges	X	X	X		X					X
Ponera	pennsylvanica	moist forests, moist fields	X[1]			X	X		X			X
Camponotus	pennsylvanicus	forest/edge	X	X			X	X			X	X
Crematogaster	lineolata	edge	X[1]									
Formica	pallidefulva	open woods, and lawns						X		X		
Formica	subintegra	open woods, edges, fields		X								
Lasius	neoniger	open fields				X				X		
Prenolepis	imparis	open woods edges				X					X[2]	
Tetramorium	caespitum EX	openings, often distrubed areas								X		
Camponotus	americanus	generalist: forests and openings		X								
Formica	subsericea	generalist: open woods, edges, fields	X	X			X	X	X			X
Tapinoma	sessile	generalist: woods, edges, fields				X				X		
TOTAL	31		13	14	2	10	7	10	7	4	12	13

Table 7: Herpetofauna of High Falls

		Ecological Unit														
		"Ancient" Hemlock-dominated Forest	"Ancient" Mixed Forest	"Ancient" SM-dominated Forest	permanent stream (Moore Pond outlet) in "Ancient" Sugar Maple-dominated Forest	Early Successional Gravel Pit	Early Successional Black Locust Stand	Early Successional Mixed Forest	Floodplain Forest	Meadow	Rich Mixed Forest, upland and talus slope	permanent stream (Stever's Pond outlet) in Rich Mixed Forest	intermittent stream in Rich Mixed Forest	seep in Rich Mixed Forest	Successional Mixed Forest
Red Back Salamander	Plethodon cinereus	x	x	x	x	x	x		x		x	x	x	x	x
Lead Back Salamander	Plethodon cinereus	x		x			x				x		x		x
Northern Two-lined Salamander	Eurycea bislineata				x				x			x	x	x	
Dusky Salamander	Desmognathus ochrophaeus	x			x				x			x		x	
Green Frog	Rana calamitans								x			x		x	
Wood Frog	Rana sylvatica						x								
American Toad	Bufo americanus												x		
Garter Snake	Thamnophis sirtalis		x				x								x

Table 8: Birds of High Falls (preliminary list courtesy of Jeanne Bergen)

(*) Veery	"Ancient" Mixed Forest	woodland bird; declining steadily over large area; not listed, but warrants conservation concern
* Wood Thrush	"Ancient" Mixed Forest	deciduous forest bird; declining rapidly; species of greatest conservation need (NYSDEC)
Red-bellied Woodpecker	Early Successional Black Locust Forest	
Downy Woodpecker	Early Successional Black Locust Forest	
Northern Flicker?	Early Successional Black Locust Forest	
(*) Eastern Wood-Pewee	Early Successional Black Locust Forest	prefers open forest, doesn't mind edges; declining, but not listed as species of special concern
Red-eyed Vireo	Early Successional Black Locust Forest	
Blue Jay	Early Successional Black Locust Forest	
American Crow	Early Successional Black Locust Forest	
Black-capped Chickadee	Early Successional Black Locust Forest	
White-breasted Nuthatch	Early Successional Black Locust Forest	
American Robin	Early Successional Black Locust Forest	
Grey Catbird	Early Successional Black Locust Forest	
Ovenbird	Early Successional Black Locust Forest	
Common Yellowthroat	Early Successional Black Locust Forest	
* Eastern Towhee	Early Successional Black Locust Forest	shrubland bird; listed as a continental stewardship species by Partners in Flight
Chipping Sparrow	Early Successional Black Locust Forest	
Song Sparrow	Early Successional Black Locust Forest	
Indigo Bunting	Early Successional Black Locust Forest	
American Goldfinch	Early Successional Black Locust Forest, but also flying throughout	
Blue-winged Warbler	Parking Area, apparently having nested near there	
House Wren	Parking Area	
(*) Belted Kingfisher	Riparian Corridor (Agawamuck)	declining, but not listed as species of conservation concern in our region
Eastern Phoebe	Riparian Corridor (Agawamuck)	
Tufted Titmouse	Riparian Corridor (Agawamuck)	
Carolina Wren	Riparian Corridor (Agawamuck)	
Winter Wren?	Riparian Corridor (Agawamuck)	seen by C. Knab-Vispo in September, probably migrating
Cedar Waxwing	Riparian Corridor (Agawamuck)	
Northern Cardinal	Riparian Corridor (Agawamuck)	
** officially listed as a species of conservation concern*		
(*) declining (according to the 2nd Breeding Bird Atlas of NYS, but not listed as a species of conservation concern		

Figure 1: Abundance of Upland Salamanders at High Falls

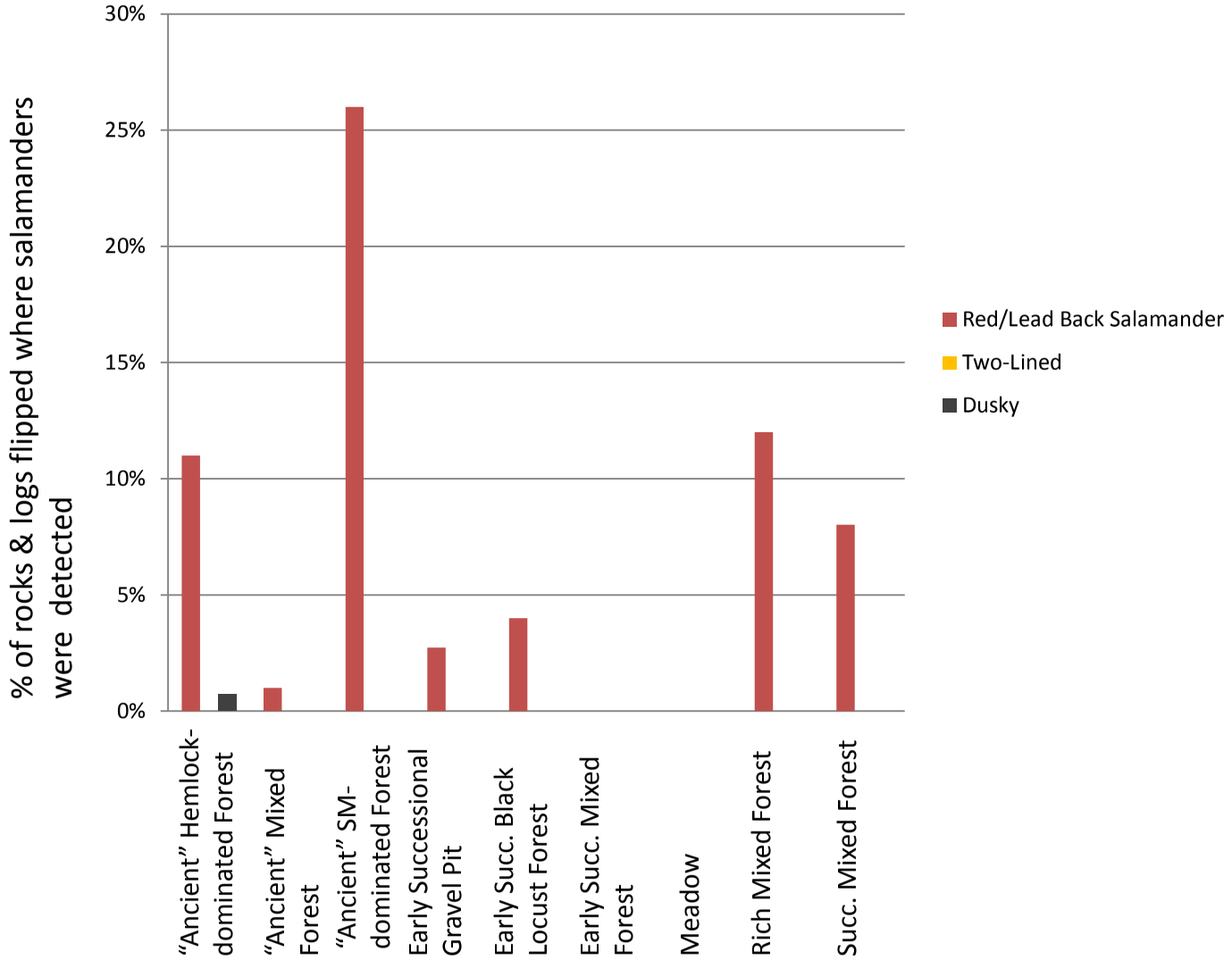


Figure 2: Abundance of Wetland Salamanders at High Falls

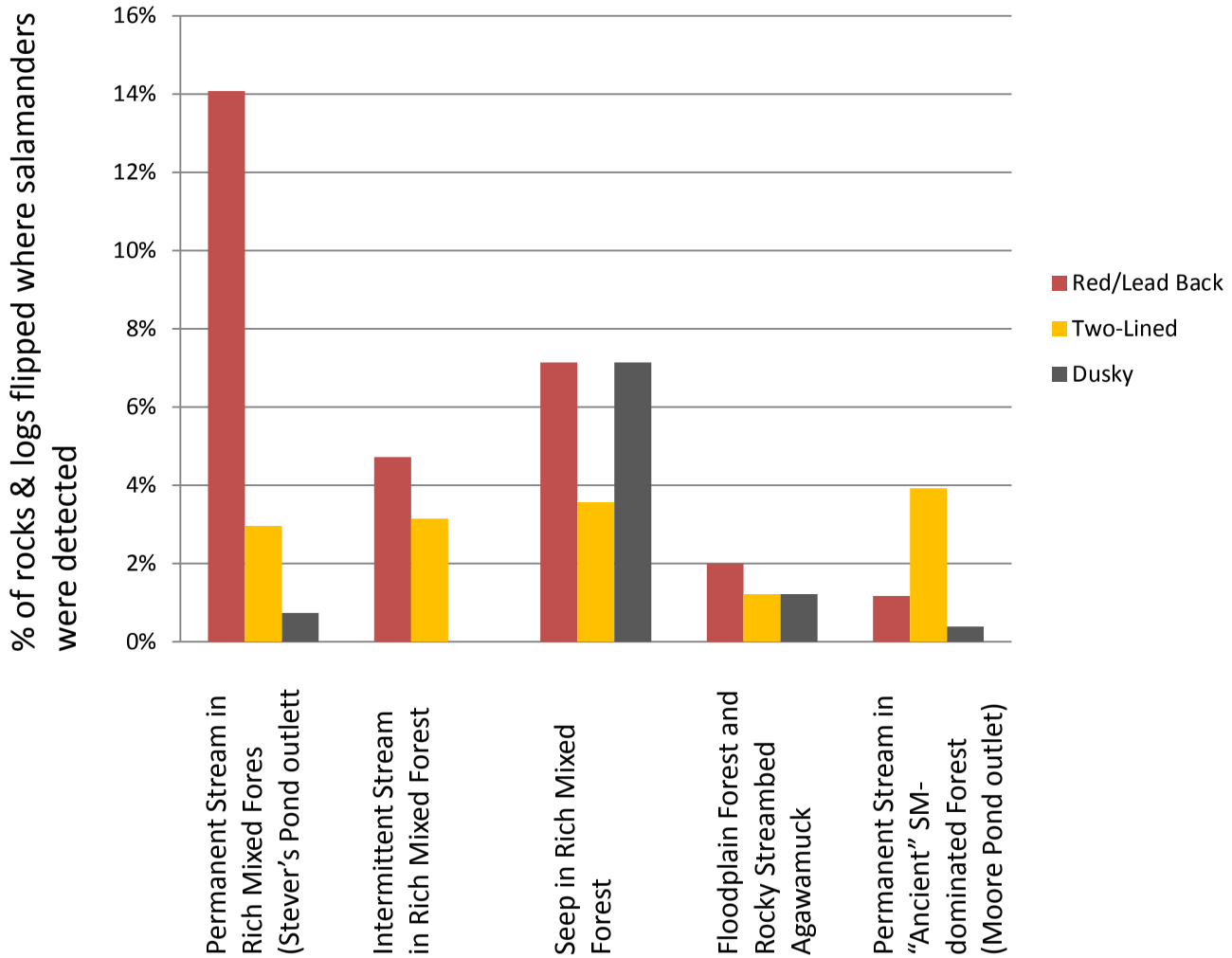


Photo Essay 1: High Falls Conservation Area – Streams (photo credits on last page)

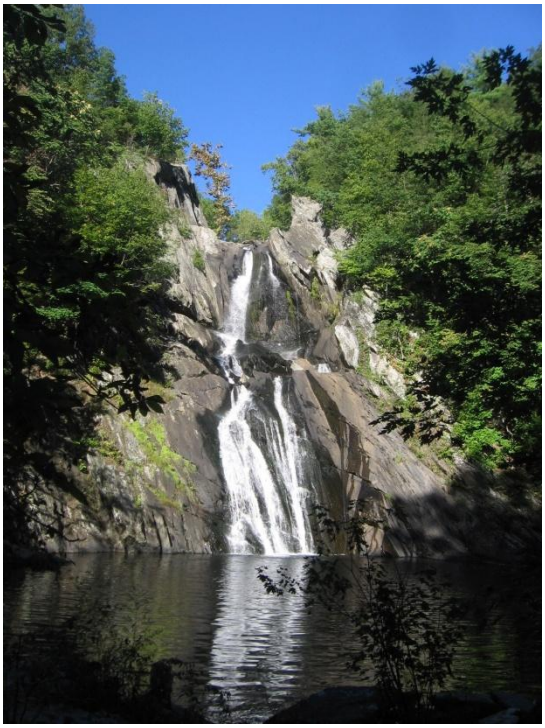


Photo 1: The waterfall of the Agawamuck.

Photo 2: The pool at the base of the waterfall.

Photo 3: The Agawamuck as it emerges from the pool at the base of the waterfall at high water in early spring.

Photo 4: The Agawamuck downriver from the waterfall during high water in spring.

Photo Essay 2: High Falls Conservation Area – Permanent Streams
(photo credits on last page)

Photo 5: The outlet of Moore Pond, a permanent stream, as seen from the trail bridge when looking upriver.

Photo 6: The outlet of Moore Pond as seen from near its confluence with the Agawamuck.

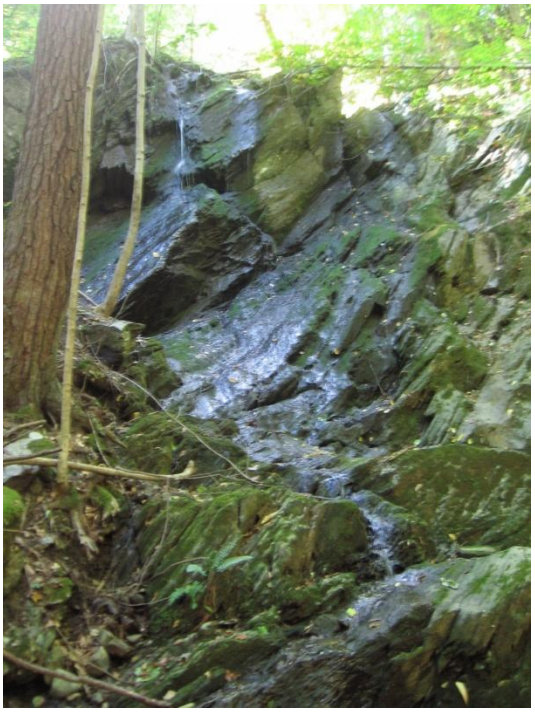


Photo 7: The outlet of Stever's Pond enters the Conservation Area with a small waterfall.

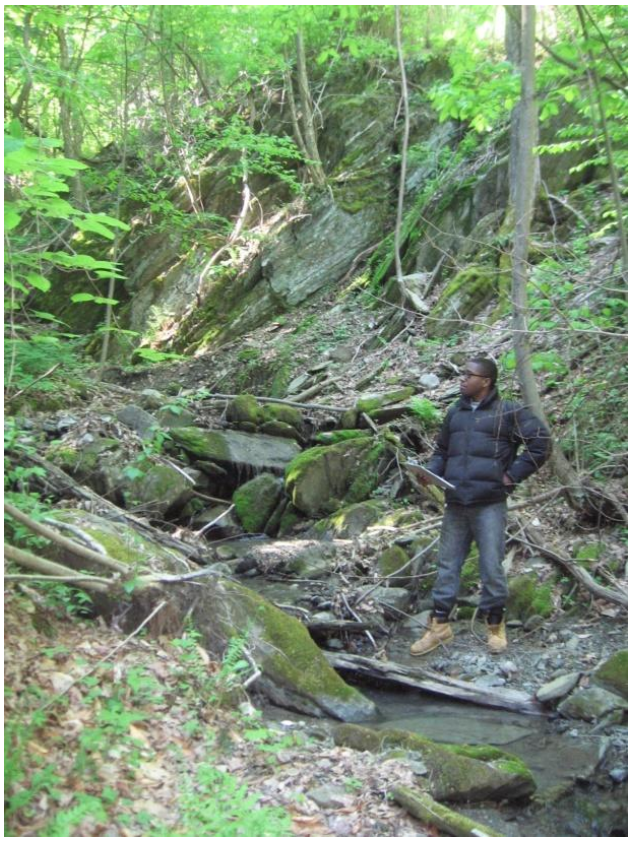


Photo 8: The outlet of Stever's Pond forms a ravine in the eastern part of the Conservation Area.

Photo Essay 3: High Falls Conservation Area – Intermittent Streams & Seeps
(photo credits on last page)

Photo 9: An intermittent stream flows along the upper boundary of the Conservation Area.

Photo 10: The intermittent stream originating near the upper boundary of the Conservation Area has a well-defined bed where it crosses the red trail.

Photo 11: A seep in the steep bank of the Agawamuck kept moist year round by emerging groundwater.

Photo Essay 4: High Falls Conservation Area – Stone Walls (photo credits on last page)

Photo 12: Remnants of a short stone wall are located along the eastern bank of the Moore Pond outlet, upriver from the trail bridge. The purpose of this wall is not clear.

Photo 13: Faint remnants of an East-West stone wall are visible in the "Ancient" Mixed Forest in the southern part of the Conservation Area. There is no obvious difference in the current forest vegetation either side of the wall which would give a clue to the wall's original purpose.

Photo 14: A long and well-preserved stone wall is located parallel to the upper boundary of the Conservation Area and separates a patch of former open land (left) from "Ancient" Mixed Forest (right).

Photo 15: A stone pile located in the forest between the red and green trails might be evidence of past attempts to plow a field in the vicinity.

Photo Essay 5: High Falls Conservation Area – "Ancient" Hemlock-dominated Forest

Photo 16: The "Ancient" Hemlock-dominated Forest is located mostly on the steep banks of the Agawamuck. It is characterized by very scant ground flora.

Photo 17: One of the few herbaceous plants found growing here and there under the Hemlock trees, is Canada Mayflower.

Photo 18: This is one of the few habitats where American Beech grows in the Conservation Area. Unfortunately, many of these trees show signs of beech bark disease.

Photo Essay 6: High Falls Conservation Area – "Ancient" Mixed Forest
(photo credits on last page)

Photos 19 & 20: The "Ancient" Mixed Forest has few shrubs in the understory and a patchy, but diverse ground flora.

Photo 21: Several patches of "lawn" composed of Pennsylvania Sedge occur throughout this ecological unit.

Photo 22: Rock outcrops are scattered throughout the "Ancient" Mixed Forest

Photo Essay 7: High Falls Conservation Area – "Ancient" Mixed Forest
(photo credits on last page)

Photo 23: Starflower is one of the more common spring flowers found in the "Ancient" Mixed Forest.

Photo 24: Gaywings or Fringed Polygala was found exclusively in the "Ancient" Mixed Forest in the Conservation Area.

Photo 25: Round-leaved Hepatica also occurred exclusively in the "Ancient" Mixed Forest in the Conservation Area.

Photo 26: This ecological unit was one of the few where Rue Anemone was found to grow in the Conservation Area.

Photo 27: Schreber's Aster is an uncommon fall flower of this ecological unit. It can be distinguished from the ubiquitous White Wood Aster by its prominent and coarse basal leaves.

Photo Essay 8: High Falls Conservation Area – Early Successional Mixed Forest
(photo credits on last page)

Photo 28: This ecological unit has a dense mid-summer ground cover of White Snakeroot. Note the small average size of the trees in this recently reforested unit.

Photo 29: In early spring, the intermittent stream in this unit is flowing freely.

Photo 30: The early successional forest is separated from the neighboring “ancient” forest by a well-preserved stone wall.

Photo Essay 9: High Falls Conservation Area –
"Ancient" Sugar Maple-dominated Forest (photo credits on last page)

Photo 31: The "Ancient" Sugar Maple Forest is striking in its lack of invasive shrubs, which are very prevalent in the more recently reforested neighboring units.

Photo 32: This ecological unit was one of two where Bloodroot was observed in the Conservation Area.

Photo 33: Moore Pond outlet and its riparian vegetation were sampled as part of the "Ancient" Sugar Maple Forest.

Photo Essay 10: High Falls Conservation Area – Early Successional Gravel Pit
(photo credits on last page)

Photo 34: The Early Successional Gravel Pit still has few trees. The trees in the background of this image are on top of the pit, above its steep bank. By mid summer, the vegetation at the bottom of the pit is dominated by a diverse mix of native and non-native herbaceous plants, interspersed with mostly invasive shrubs.

Photo 35: The Early Successional Gravel Pit in late winter.

Photo Essay 11: High Falls Conservation Area –
Early Successional Black Locust Stand (photo credits on last page)

Photo 36: This unit is characterized by a dense shrub layer of an invasive honeysuckle (*Lonicera morrowii* and/or *bella*) with widely spaced large Black Locust and smaller Tree-of-Heaven trees emerging from it.

Photo 37: The tall Black Locust trees support a dense growth of vines, mostly Virginia Creeper and some Poison Ivy.

Photo 38: Small Black Locust trees are growing around the parking area. The early wilting of their leaves in late summer is caused by a tiny beetle, the Locust Leafminer, which infests many Black Locust stands throughout the County but does not seem to seriously damage the trees.

Photo Essay 12: High Falls Conservation Area –
Early Successional Black Locust Stand (photo credits on last page)

Photo 39: The invasive Tree-of-Heaven grows together with Black Locust around the parking area, around the gravel pit, but also as individual trees or in small colonies throughout the Conservation Area. It looks superficially similar to Staghorn Sumac, but grows much taller. It's fruits are dry, winged, wind-dispersed samaras which are presented in dangling reddish clusters on female trees. Upon closer inspection, they are very different from the fuzzy red berries presented in upright, cone-shaped inflorescences of Staghorn Sumac.

Photo 40: These decorative, palm-like leaves seen against the sky in the Early Successional Black Locust Stand belong to the invasive Tree-of-Heaven.

Photo Essay 13: High Falls Conservation Area – Early Successional Black Locust Stand

(photo credits on last page)

Photo 41: Common Violet, Goldenrod and Jewelweed grow in dense patches in this ecological unit.

Photo 42: Most of the ground is covered by Chickweed, an introduced agricultural weed which is not usually very common in forested areas. Note the native Jack-in-the-Pulpit also finding a place amongst the introduced plants.

Photo 43: The very invasive Japanese Stiltgrass dominates several patches along the red trail.

Photo 44: The invasive Japanese Stiltgrass (right) can be recognized by its relatively short and broad leaves, sprawling habit, and whitish line along the midrib. The similarly sprawling native Whitegrass (on the left), has comparably narrower leaves, no white line, but always somewhat scratchy nodes along the stalk.

Photo Essay 14: High Falls Conservation Area – Successional Mixed Forest

(photo credits on last page)

Photo 45: The Successional Mixed Forest has a markedly denser shrub layer than the neighboring “Ancient” Mixed Forest. Many, but not all, of the shrubs are invasive species.

Photo 46: We were pleasantly surprised to find the regionally rare Northern Beech Fern exclusively in this ecological unit.

Photo Essay 15: High Falls Conservation Area – Floodplain Forest

(photo credits on last page)

Photo 47: In mid summer, dense patches of the native Wood Nettle can be found in some floodplain forest areas. In other places, a diverse mix of nutrient and moisture loving herbaceous plants, including many spring ephemerals, cover the ground in the floodplain forest.

Photo 48: The regionally rare shrub Leatherwood was found exclusively in the floodplain forest of this Conservation Area.

Photo 49: Over all, the floodplain forests at High Falls have comparatively few invasive plants (with one big exception, see next page!). This winter image illustrates the sparse shrub layer, which seems to be indicative of an “ancient” floodplain.

Photo Essay 16: High Falls Conservation Area – Floodplain Forest

(photo credits on last page)

Photo 50: A dense patch of the invasive Japanese Knotweed dominates the herbaceous layer of the floodplain forest near the mouth of Moore Pond outlet.

Photo 51: The tiny white flowers of Japanese Knotweed attract many pollinators.

Photo 52: The triangular winged fruit of Japanese Knotweed mark it as a close relative of Dock.

Photo Essay 17: High Falls Conservation Area – Rocky Creekbed and Gravelly Island

(photo credits on last page)

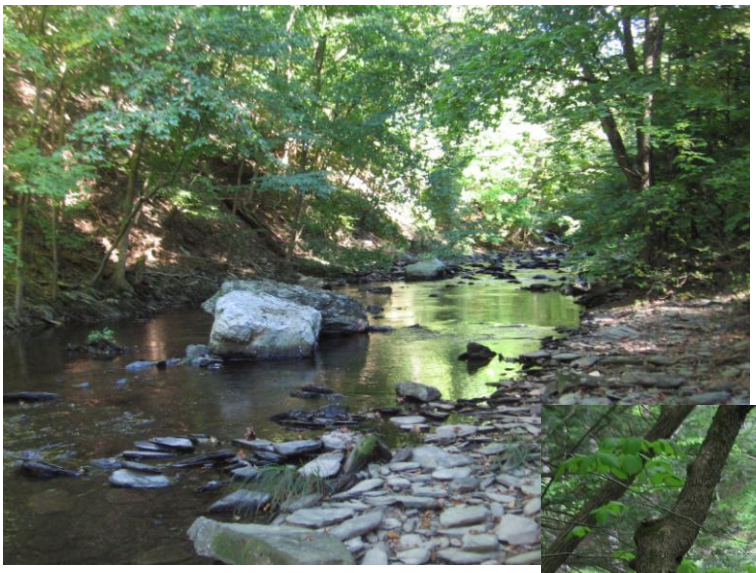


Photo 53: The Rocky Creekbed of the Agawamuck.

Photo 54: The upriver portion of the Gravelly Island known locally as Snake Island. The tall, broad-leaved plant in the center of the image is the invasive Japanese Knotweed, the grassy plant on the right is the native Tussock Sedge.

Photo 55: Gold-moss (*Sedum acre*) forms carpets on many rocks in the streambed, especially near the falls.

Photo 56: Herb Robert is also quite common among the rocks in the Rocky Streambed.

Photo Essay 18: High Falls Conservation Area – Rich Mixed Forest, incl. Ravines & Ledge/Talus (photo credits on last page)

Photo 57: Rich Mixed Forest in the valley of Stever's Pond outlet.

Photo 58: Stever's Pond outlet and Rich Mixed Forest on steep slope seen from the old, closed-off trail going down to the base of High Falls.

Photo 59: The ravines joining Stever's Pond outlet from the east were mapped as part of the Rich Mixed Forest .

Photo 60: Big rocky ledges with abundant Yellow Birch were also included in the ecological unit of the Rich Mixed Forest.

Photo Essay 19: High Falls Conservation Area – Rich Mixed Forest, incl. Ravines & Ledge/Talus (photo credits on last page)

Photo 61: The regionally scarce Mountain Maple occurred exclusively in the Rich Mixed Forest of the Conservation Area.

Photos 62 & 63: Wild Ginger (above) and Foamflower (below) were additional examples of plants unique to this ecological unit of the Conservation Area.

Photo 64: Bulblet Fern tends to grow in our region only on or near calcium-rich rocks. At High Falls, it exclusively occurs in the Rich Mixed Forest at the base of the slope next to the Agawamuck.

Photo 65: Columbine was seen here and in one other ecological unit of the Conservation Area.

Photo Essay 20: High Falls Conservation Area – Rich Mixed Forest, incl. Ravines & Ledge/Talus (photo credits on last page)

Photos 66 & 67: The regionally rare American Spikenard only occurred in the Rich Mixed Forest. Unfortunately, the promising-looking plants observed in May (above) were later severely browsed by deer (right).

Photo 68 : The regionally scarce Blue Cohosh forms a dense patch right next to the trail near the overlook. Interestingly, this patch seems to thrive well under the canopy of a small colony of the invasive Tree-of-Heaven.

Photo Essay 21: High Falls Conservation Area – Rich Mixed Forest, incl. Ravines & Ledge/Talus (photo credits on last page)

Photos 69 - 72: Examples of different species of violets found in the Rich Mixed Forest at High Falls: Early Blue Violet (top left), Yellow Wood Violet (top right), Long-spur Violet (bottom left) and Sweet White Violet (bottom right). Most of these species were not exclusive to this ecological unit at High Falls, but the diversity and density of violets, such as of many other wildflowers, is exceptionally high in this area.

Photo Essay 22: High Falls Conservation Area – Meadow around Parking Area

(photo credits on last page)

Photo 73: The stand of tall herbaceous plants growing on both sides of entrance to the Conservation Area in the Parking Lot Meadow is the invasive Mugwort. Although it provides a nice border for the entrance trail, it should not be allowed to go to seed and spread further. In the long term, it would be desirable to replace the Mugwort with native plants.

Photo 74: The southern part of the Parking Lot Meadow is totally overgrown by the invasive Japanese Stiltgrass. This annual plant can be kept from spreading further by mowing it in late summer, when in flower, but not yet in seed. Earlier mowing encourages re-sprouting (which is ok if it gets mowed again before going to seed) and mowing after the seeds have matured will help propagate this aggressive invasive.

Photo Essay 23: High Falls Conservation Area – Ground Beetles

(photo credits on last page)

Photo 75: *Pterostichus rostratus* is aptly named – it has a large head with long jaws (possibly for opening chrysalises and cocoons). These features, together with its comparatively large size (up to nearly ¾") and stocky body can make it a relatively imposing beast. It was one of the most common ground beetles at High Falls, being found at the majority of the upland forest sites.

Photo 76: *Pterostichus tristis* was, together with *Pterostichus rostratus*, the most widespread ground beetle in our study. It was found at many of the same forested High Falls sites as *P. rostratus*, but is of slightly smaller average size.

Photo 77: *Poecilus lucublandus* is a medium-sized (ca. 1/2") beetle with a marked blue-green cast. This species is something of a generalist: it is reported from woodland, floodplain and open sites, and feeds upon both insects and plants. At High Falls, we only found this beetle at the Early Successional Gravel Pit, although, as with many of the other beetles, it probably also occurs in other parts of the Conservation Area.

Photo 78: *Pterostichus stygicus* is about the same size as *Pterostichus rostratus* but with less impressive 'head gear'. Ecologically, this species seems to be a generalist found in a variety of different habitats. At High Falls, it was found in the Early Successional Gravel Pit and the Early Successional Mixed Forest.

Photo Essay 24: High Falls Conservation Area – Ground Beetles (photo credits on last page)

Photo 79: *Harpalus rufipes* is a medium-sized ground beetle, about ½" long. The amber-colored fuzz on the wing covers is characteristic. It is a 20th century European import that is common on some agricultural fields in the County. At High Falls, it was found in the Early Successional Black Locust Stand.

Photo 80: *Trichotichnus vulpeculus* has a markedly reddish head and pronotum contrasted with darker wing covers. It is about ⅓" in length. It is reportedly a species of moist forest and, at High Falls, was found only in the Successional Mixed Forest.

Photo 81: *Notophilus aeneus* is a small (<¼") beetle with 'buggy eyes' and a 'furrowed brow'. It is a forest-dwelling, caterpillar eater and was only recorded from the Early Successional Mixed Forest at High Falls.

Photo Essay 25: High Falls Conservation Area – Ground Beetles (photo credits on last page)

Photo 82: *Agonum extensicolle* is, as the photo suggests, a creature of wet areas and seems well capable of coping with seasonal flooding. It is about ⅓rd of an inch long and usually has a distinctive greenish hue. It was found along streams and in adjacent Floodplain Forest at High Falls.

Photo 83: *Nebria pallipes* is often quite common along stream sides and is an adept swimmer. It is almost ½" long with distinctive light-colored legs. At High Falls, it was found streamside, around seeps, and in the Floodplain Forest.

Photo 84: *Platynus tenuicollis* is about ½" long and another resident of moist forest, including that of floodplains. At High Falls, it was found in moist microhabitats of the "Ancient" Sugar Maple dominated Forest, the "Ancient" Mixed Forest, and the Rich Mixed Forest.

Photo Essay 26: High Falls Conservation Area – Ants (photo credits on last page)

Photo 85: *Aphaenogaster picea*, the most common ant collected at the Conservation Area.

Photo 86: *Aphaenogaster fulva*, the second most common ant collected in the Conservation Area.

Photo 87: *Lasius alienus*, a regionally common forest species which was the third most common ant collected in the Conservation Area.

Photo 88: *Camponotus americanus*, found only in the "Ancient Mixed Forest" at the Conservation Area. This species has so far been found at only one other site in the County.

Photo 89: *Crematogaster lineolata*, a field and edge species, which was found only in a clearing in the "Ancient" Hemlock-dominated Forest.

Photo Essay 27: High Falls Conservation Area – Ants (photo credits on last page)

Photo 90: The slave making ant, *Formica subintegra*, which was found with its host in the "Ancient" Mixed Forest.

Photo 91: *Formica subsericea*, belongs to the fusca group which is characterized by silvery pubescence. *F. subsericea* is the host for *F subintegra* in the "Ancient" Mixed Forest.

Photo 92: *Myrmica detritinodis*, has an affinity for cooler temperature forests and is an indicator of mature forests. It was found only in the "Ancient" Mixed Forest of the Conservation Area.

Photo 93: *Tetramorium caespitum*, a European native common in disturbed areas and present in the parking lot meadow.

Photo 94: Head of *Stigmatomma pallipes*, the hemolymph drinking "Vampire Ant", is a predator on centipedes, small caterpillars, and beetle larvae. This species was only found in the Early Successional Mixed Forest of the Conservation Area.

Photo Essay 28: High Falls Conservation Area – Dragonflies (photo credits on last page)

Photo 95: Riffle Snaketail, a state rare species found along the Agawamuck at High Falls.

Photo 96: Least Clubtail, a recently emerged individual at the shore of the Agawamuck. The empty skin of its aquatic larva (exuvia) is visible in the bottom right of the image and evidence that this locally uncommon species reproduces within the High Falls Conservation Area.

Photo 97: Twin-spotted Spiketail, while not rare throughout the state, is one of the species we consider uncommon in Columbia County. This individual observed on the shore of the Agawamuck at High Falls was only our 3rd record of this species in the County.

Photo Essay 29: High Falls Conservation Area – Other Invertebrates

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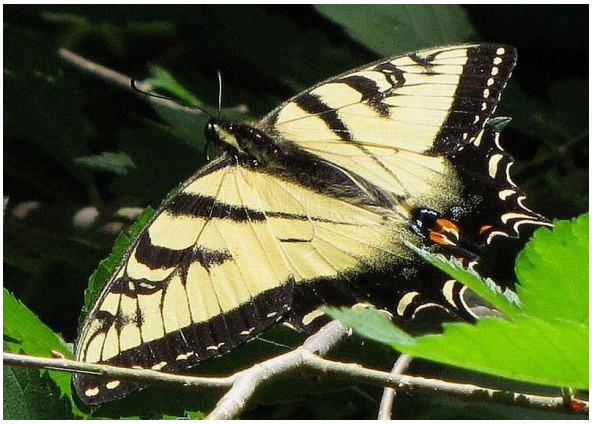

Photo 98: Tiger Swallowtail is a relatively common butterfly whose larva eat the leaves of a variety of deciduous trees, such as Tuliptree and Wild Cherry, which both occur at High Falls.

Photo 99: A water spider on the shores of the Agawamuck.

Photo 100: A Hellgrammite, which is the two inch long aquatic larva of a Dobson Fly. These larvae are indicators of relatively clean, well-oxigenated water in the Agawamuck.

Photo 101: A Juvenal's Duskywing butterfly in the Early Successional Gravelpit. This is a relatively common butterfly whose caterpillars feed on oak leaves.

Photo 102: The inconspicuous, but beautiful Banded Hairstreak butterfly was observed in 2012 the "Ancient" Hemlock Forest.

Photo 103: A Tiger Beetle on the shores of the Agawamuck.

Photo Essay 30: High Falls Conservation Area – Herpetofauna (photo credits on last page)

Photo 104: A Dusky Salamander found under a rock at the shore of the Agawamuck.

Photo 105: A Dusky Salamander female guarding her eggs under a rock in a seep in the Rich Mixed Forest near the outlook over High Falls.

Photos 106 and 107: Garter Snakes encountered in upland forests at High Falls.

Photo Credits for the Photo Essay of High Falls Conservation Area

Unless otherwise noted, the photos are by Claudia Knab-Vispo
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