# Biodiversity Inventory
## of
# Hogback Mountain Conservation Area
## Marlboro, Vermont

Conducted May 2018 – January 2019

by

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## Contents

## Introduction

The 591-acre Hogback Mountain Conservation Area, owned by the Town of Marlboro, Vermont, was created in 2010 with the following objectives:

- conservation of wildlife, aquatic and plant habitat, and scenic resources to ensure its biological health for present and future generations;
- provision of equitable and safe public recreational access and educational opportunities in a scenic and healthy natural setting through low-impact, low-density, non-motorized, dispersed activities; and
- maintenance of forest resources through long-term professional management which endeavors to minimize to the greatest extent possible any negative impact of forestry activity on surface water quality, wildlife habitat, public recreational benefits, and other conservation values.

In order to inform future management, including possibly delineating zones for achieving these sometimes competing objectives, this biodiversity inventory was commissioned by the Hogback Mountain Conservation Association (HMCA), a non-profit, non-governmental, volunteer organization that aids the Town in meeting its goals for the Conservation Area.

## History, Setting, and Previous Studies

The Hogback Mountain Conservation Area straddles Vermont Route 9 at the west end of the Town of Marlboro (Figure 1). It includes the former Hogback Ski Area, which was active from the 1940s to the 1980s. The 203-acre portion south of Route 9 includes the east side of Mount Olga, the summit of which is in adjacent Molly Stark State Park. The old ski trails in this portion (occupying approximately 15 acres, according to Gulka 2015) are in various stages of ecological succession. Otherwise, the property consists mostly of upland forest, interspersed with small, open and forested wetlands. The 388-acre portion north of Route 9 includes three peaks: Hamilton Hill (2248′), Little Hogback (2354′), and Hogback Mountain (2409′). A VAST (Vermont Association of Snow Travelers) snowmobile trail runs the length of the property, and a network of hiking trails traverses Mount Olga, Hogback Mountain, and Little Hogback. There are currently no trails on Hamilton Hill.

Forester Joshua Puhlick conducted a forest stand inventory on the northern portion of the property in early 2008 (Puhlick 2008; Gulka 2015). A natural community map referenced in his report (its creator is unknown) covers the whole property, along with areas adjacent to Route 9 that were ultimately excluded from the Conservation Area and are now privately owned. This map shows the property dominated by Northern Hardwood forest, with large stands of Lowland Spruce – Fir and smaller patches of Red Spruce – Northern Hardwood and Montane Spruce – Fir. Mapped wetland communities (some of them too small to be discernible on the map, but appearing in the legend) include "Red Spruce Hardwood Swamp," an unspecified "Forested wetland," "Bog/Fen," Cattail Marsh, "Sedge," vernal pools, and seeps.

According to Puhlick, the Northern Hardwood forest north of Route 9 is dominated by sugar maple, American beech, and yellow birch (94% of the total basal area), with white ash and red maple also present. (He also discussed a distinctly different stand in the northwest corner where there is more red maple, due to some combination of harvest history, aspect, and drainage.) His

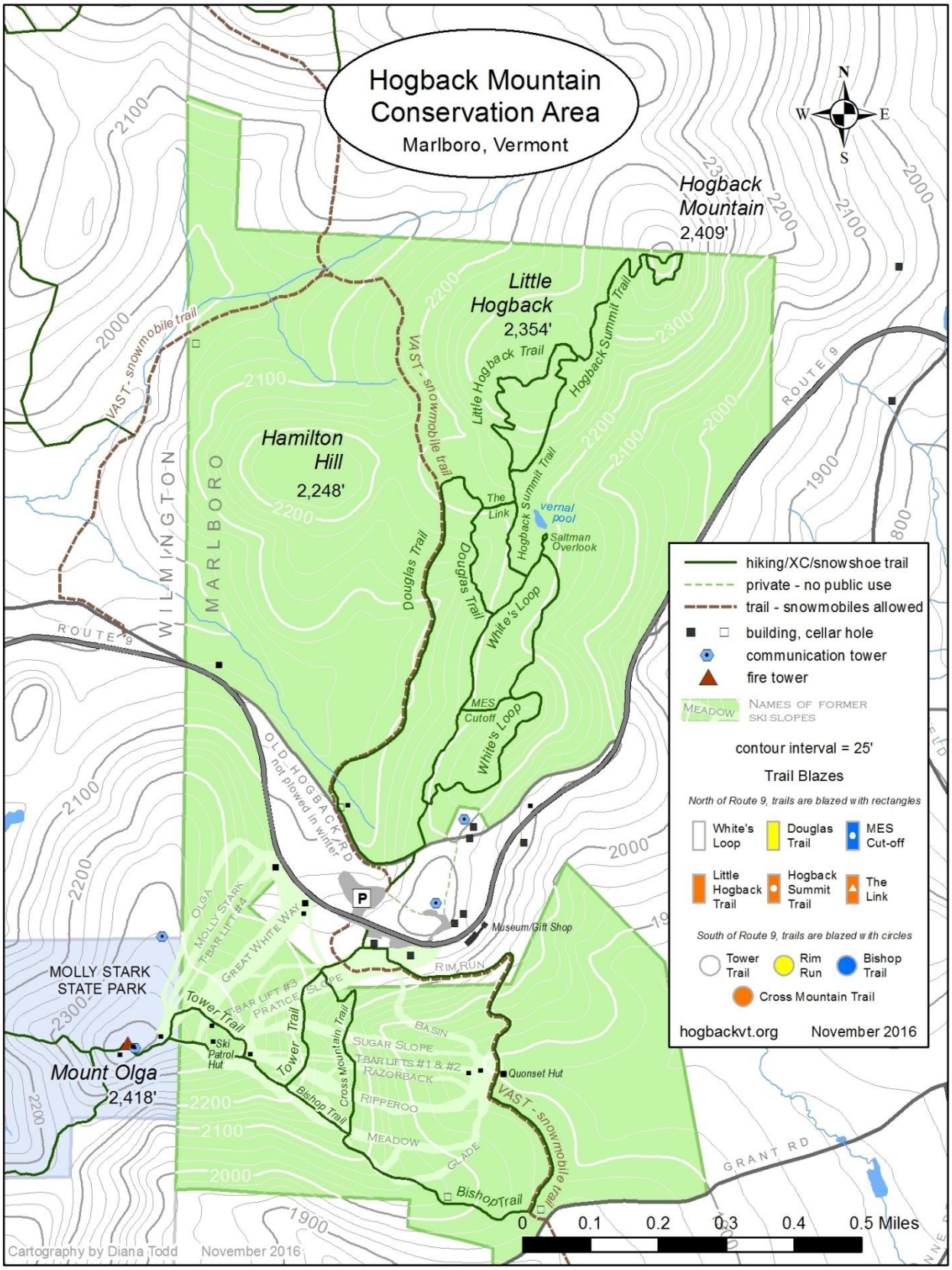



**Figure 1: Map of trails and other named features, provided by HMCA.**

calculations indicated that the stand was at an appropriate stocking level in 2008, but he projected that by 2018 the density may be higher than recommended for optimal growth. There were 158 trees per acre, with an average dbh (diameter at breast height) of 10.3 inches. He noted a high severity of beech bark disease, and suggested that if a harvest were to occur, it should focus on removing some of the mid- to large-sized, diseased beech, retaining individuals showing signs of disease resistance and those with a high wildlife value. He recommended that most of the maple be allowed to put on more growth for future harvests. This first harvest would therefore be an improvement cut yielding fuelwood, and substantial economic returns would only be captured in future harvests. Puhlick noted that the understory was dominated by beech and striped maple, with scattered sugar maple saplings. He reported that snags of varying heights and stages of decay were well distributed across the stand.

Also in 2008, state botanist Bob Popp visited the property with a Marlboro College Ecology class and documented a population of purple milkwort, a state-listed uncommon plant species, in the old ski area (Popp et al. 2008).

Gulka (2015) noted that following Puhlick's inventory, a severe ice storm in December 2008 significantly damaged hardwood stands in the eastern sections of the property. She evidently had access to a longer report than I have seen, because she stated that the inventory also mentions Hemlock – Northern Hardwood Forest in both portions of the property, as well as an area of Mesic Red Oak – Northern Hardwood Forest in the southern portion. She also listed the wetland communities Sedge Meadow, Dwarf Shrub Bog, and Poor Fen.

A forest bird habitat assessment of the Conservation Area was conducted by Audubon Vermont on July 27, 2011 (Hagenbuch 2012). The property's large amount of unfragmented, interior forest was cited as a great asset, beneficial to species such as ovenbird, black-throated blue warbler, and Blackburnian warbler. On the other hand, young / early successional conditions were estimated to be at or just below the minimum threshold (3–5% of a 2500-acre landscape) deemed necessary to support breeding populations of bird species associated with these habitats.

Three habitat units were identified, with characteristics as follows:

- Mature hardwood/mixedwood forest (~409 acres; ~69% of property) – High (>60′), closed canopy (>80% cover) forest of mostly pole- and small sawtimber-sized trees, with 30–80% canopy cover in areas affected by the 2008 ice storm. Understory and midstory vegetation layers are well-developed in some areas, especially those that are storm-damaged or more recently harvested, and less developed in other areas. Species such as black-throated blue warbler, wood thrush, and scarlet tanager benefit from greater vertical structure. The softwood inclusion in the northeast corner is a desirable feature that should attract species such as black-throated green warbler, blue-headed vireo, and Blackburnian warbler, whereas pure hardwood stands are preferred by ovenbird, eastern wood-pewee, and American redstart. Small snags and cavity trees are relatively common, but larger (>10″ dbh) hardwood snags and cavity trees, which are of greater habitat value (e.g. to yellow-bellied sapsucker and northern flicker), are less abundant. A good amount of coarse woody debris was observed, benefitting species such as ovenbird and ruffed grouse, while species such as white-throated sparrow and veery could benefit from additional fine woody debris (<4″).

- Mature softwood forest (~150 acres; ~25% of property) – This unit was not actually visited during the assessment. As noted above, softwood cover is preferred by black-throated green warbler, blue-headed vireo, and Blackburnian warbler. Dense patches of spruce and fir saplings in canopy gaps attract magnolia warbler and white-throated sparrow. Within softwood forests, wetlands may provide habitat for Canada warbler if they have low canopy height and abundant shrubs, logs and/or tipups, hummocks, and herbaceous cover.
- Early successional (~37 acres; ~6% of property) – According to Hagenbuch, early successional habitat conditions generally include an open canopy (<30% cover) and high densities of seedlings, saplings, and shrubs up to 20′ in height. These habitats typically persist for 15–20 years after they are created, and they are required by species such as chestnut-sided warbler, mourning warbler, Nashville warbler, ruffed grouse, American woodcock, and white-throated sparrow.

The report provides management options for improving forest bird habitat, while keeping the following considerations in mind:

- Retain as many yellow birch trees as possible, because the branches and foliage of this species are preferentially chosen foraging substrates for insectivorous birds such as Blackburnian warbler, black-throated green warbler, and scarlet tanager.
- Minimize harvesting during bird breeding season (May–August); winter harvesting can also help protect advanced regeneration and understory shrubs from damage.
- Minimize extent of forest access roads, which can serve as pathways for increased nest predation and parasitism.

Hagenbuch estimated that ~84 acres of the Conservation Area are in the 0–20 year age class, and considered this to be within the target range (3–5 % of the landscape). He therefore suggested that no additional early successional habitat needs to be created, but recommended that the habitat be divided into ten 8-acre management units, with one being cleared back every two years on a rotating basis. Special considerations while rejuvenating early successional habitat include:

- Retain as many fruit-producing trees and shrubs as possible.
- Cut stems can be left where they fall or 1–2 brush piles per acre can be created.
- Invasive exotic plant species may become established in cleared areas; develop a plan for their control prior to implementation.

In 2012, an early successional habitat management plan based on the above recommendations was proposed (HMCA 2012), and implementation began the following year. Instead of ten management units on a 20-year cycle, five areas were selected to be maintained on a 10-year cycle: Meadow (2013), Great White Way (2015), Practice Slope (2017), Ripperoo (2019), and Sugar Slope (2021). In the intervening (even-numbered) years, small areas were to be thinned where the need seemed urgent (i.e., where waiting until the scheduled year would result in trees too large for volunteers to be able to clear them). An invasive plant management plan was prepared by Vermont Land Trust (Gulka 2015); specific findings of the October 2015 survey are discussed later in this report.

In recent years, several student projects have addressed various aspects of the Conservation Area's biodiversity. Schiller (2013) examined the vegetation and soil within three small plots in meadow, woods, and swamp habitats of the former ski area; the results are displayed on the HMCA website. Within the managed early successional habitats, Ackerman (2015) compared areas where cut stems and branches were left in place (thatched) with areas where they were consolidated into brush piles, and found that the former had lower hay-scented fern density and higher plant diversity. The effect may be due to thatching limiting deer browsing and allowing nutrients from branches to return to the soil. Hollertz (2015) found higher diversity and abundance of soil microinvertebrates in early successional than mid- and late successional habitats. Hunt (2016) trapped small mammals in the southern portion of the property in fall 2015, examining them for ticks and finding none. Hulsey & Baker (2015) netted songbirds from late August to early October 2015; the results are incorporated into the wildlife list in this report, along with species listed by Engel (2013) and Corey (2018).

## Methods

*Review of existing data* – In spring 2018, I reviewed all existing reports, maps, and GIS data related to the Conservation Area (provided by HMCA), compiling the information relevant to this inventory.

*Vernal pools* – On May 8, 11, and 17, I searched the Conservation Area for possible vernal pools. I began by visiting all the potential pools mapped by Saltman (2011), using the remaining time to target other wetlands and relatively flat areas shown on this and other maps. At each pool I recorded the approximate length, width, and depth; numbers of spotted salamander and wood frog egg masses; and notes on any other species or distinctive features.

*June–September field visits* – Subsequent fieldwork was conducted on June 8, 19, and 21; August 10, 19, 23, and 27; and September 5, 7, and 9. The natural community map was refined throughout the summer, beginning by visiting each community delineated on the previous, anonymously created natural community map. Each community was classified using Thomson & Sorenson (2000). Boundaries between deciduous and coniferous forest types were generally visible on orthophotos; I delineated other communities (wetlands and Rich Northern Hardwoods) by walking their perimeters. I walked the trails, followed the full length of every stream, and walked transects across areas that appeared as gaps in my accumulated track logs. All the while I kept a running list of flora and fauna observed, recording GPS locations for noteworthy species (or signs thereof) and collecting samples of plants that could not be identified in the field.

*Snow tracking surveys* – On December 12 I surveyed for mammal tracks, using the VAST and hiking trails (with some bushwhacking) to form a transect loop through the northern portion of the property. On January 12, 2019 I walked a loop through the southern portion, targeting wetlands, thickets, and ledges I had noted throughout the summer. On January 16 I did the same in the northern portion.

GPS data were collected using a Garmin GPSmap 76CSx unit. Photographs were taken in the field with an Olympus Stylus TG-4 camera. All maps were created using ArcMap 10.4.1. Shapefiles for property boundaries, trails, structures, other infrastructure, and the footprint of the

old ski area were provided by HMCA; those for natural communities, seeps, vernal pools, streams, rare and uncommon species, wildlife observations, and habitat features were created by me.

## Natural Communities

This inventory identified four upland forest communities and six wetland communities, in addition to human-created early successional habitat. It is important to note that the entire forest is human-modified to some extent: old cut stumps and logging roads can be found throughout the Conservation Area, and portions were historically cleared for pasture, as well as more recently for the ski area. The canopy species are therefore not always good indicators of what the forest "wants" to be, and understory species were weighed heavily in determining what it would look like if left undisturbed. For example, although Gulka (2015) referred to an area of Mesic Red Oak – Northern Hardwood Forest in the southern portion, I observed very little oak regeneration on the property and concluded that where red oak is prominent, this is entirely a result of past management.

The property's natural communities, as interpreted and delineated by me in the field, are shown on Map 1 and summarized below. Following the name of each community type listed below are the state rank, the page numbers in Thomson & Sorenson (2000) that describe the community, and the figure number(s) for any photos illustrating the community.

State Rarity Ranks for Vermont Natural Communities (from Thomson & Sorenson 2000)
S1: very rare in the state, generally with fewer than five high quality occurrences.
S2: rare in the state, occurring at a small number of sites or occupying a small total area in the state.
S3: high quality examples are uncommon in the state, but not rare; the community is restricted in distribution for reasons of climate, geology, soils, or other physical factors, or many examples have been severely altered.
S4: widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small.
S5: common and widespread in the state, with high quality examples easily found.

### Northern Hardwood Forest
(S5; pp. 132–137; Figures 2–3)

This is Vermont's most common forest type and is the dominant community at Hogback Mountain Conservation Area, especially north of Route 9. The canopy is dominated by sugar maple, red maple, beech, and yellow birch, with occasional white ash and black cherry. Sugar maple and beech saplings are common in the understory, with striped maple abundant in some areas. In spring the forest floor is carpeted with trout lilies; after these have faded away, shining firmoss and bristly clubmoss are among the most prominent low plants. East of the Southern Vermont Natural History Museum and gift shop is an example of the richer Sugar Maple – White Ash – Jack-in-the-pulpit Northern Hardwood Forest variant (S4).

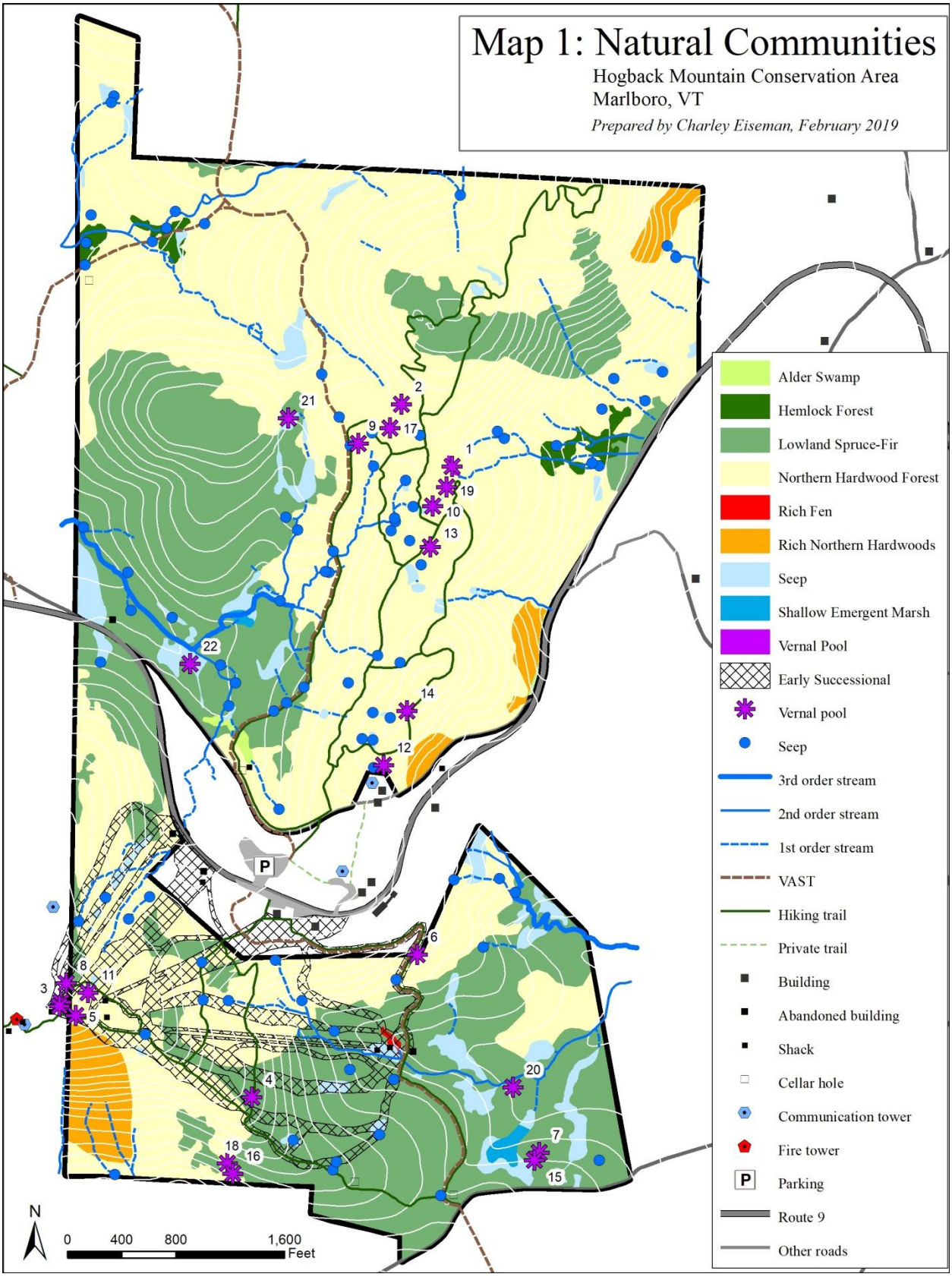

Map 1: Natural Communities
Hogback Mountain Conservation Area
Marlboro, VT
Prepared by Charley Eiseman, February 2019
Alder Swamp
Hemlock Forest
Lowland Spruce-Fir
Northern Hardwood Forest
Rich Fen
Rich Northern Hardwoods
Seep
Shallow Emergent Marsh
Vernal Pool
Early Successional
Vernal pool
Seep
3rd order stream
2nd order stream
1st order stream
VAST
Hiking trail
Private trail
Building
Abandoned building
Shack
Cellar hole
Communication tower
Fire tower
Parking
Route 9
Other roads
N
0 400 800 1,600
Feet

**Figure 2: Northern Hardwood Forest.**

**Figure 3: Storm-damaged Northern Hardwood forest with dense beech saplings in understory.**

**Figure 4: Closed-canopy Lowland Spruce-Fir.**

**Figure 5: Storm-damaged Lowland Spruce-Fir.**

## Lowland Spruce-Fir

(S3; pp. 115–118; Figures 4–7)

The previous (anonymously made) natural community map shows areas of Red Spruce – Northern Hardwood and Montane Spruce-Fir as well as Lowland Spruce-Fir. However, the Montane Spruce-Fir community defined by Thomson & Sorenson occurs mostly above 2800′ in the southern Green Mountains, and even in northern Vermont its lower limit is said to be 2500′. It is characterized by heart-leaved paper birch and American mountain-ash mixed in with a dense spruce-fir canopy, along with an abundance of hobblebush, mosses, and herbs such as mountain wood fern, bluebead lily, and shining clubmoss in the understory. Red Spruce – Northern Hardwood Forest is likewise characterized by boreal herbs, and this label is applied to "situations where softwoods and hardwoods occur in mixed stands and persist that way over time"—although Thomson & Sorenson later state that this community "may, in many cases, be a successional stage of what will ultimately become softwood forest." Very little of the property actually has a dense canopy of red spruce and balsam fir, due to trees being removed by a combination of past logging and storm damage, but in some areas these species are prominent—sometimes in the canopy, but more often in the understory, where the saplings can be extremely

**Figure 6: Logged Lowland Spruce-Fir on the north side of Hamilton Hill, with dense hay-scented fern (photo taken in May).**

**Figure 7: Mid-successional Lowland Spruce-Fir on the south side of Hogback Mountain, with northern hardwood canopy and dense spruce understory.**

dense. My impression is that these areas would all ultimately become dominated by spruce and fir if left alone (at least, in the absence of climate change), and I have chosen to lump them all under "Lowland Spruce-Fir" because of the generally sparse, low-diversity herb layer and the scarcity or absence of indicator species such as those noted above. Red raspberry and hay-scented fern are abundant in disturbed areas such as the blowdowns on Hamilton Hill. In some cases, areas mapped as Lowland Spruce-Fir have a canopy composed entirely of hardwoods. Based on Thomson & Sorenson's description, a confusing species composition resulting from past logging is typical of this community in Vermont.

**Rich Northern Hardwoods**
(S4; pp. 138–141; Figure 8)

This is by far the most diverse upland forest type on the property in terms of plant species composition. There is a patch near the southwest corner, another at the northeast corner, and two patches along the eastern portion of Old Hogback Road. The canopy is dominated by sugar maple and white ash, with a lush herb layer including blue cohosh, squirrelcorn, wild leek, white snakeroot, zigzag goldenrod, blue-stemmed goldenrod, pale touch-me-not, wood nettle, foamflower, two-leaved

**Figure 8: Rich Northern Hardwoods, with sugar maples at left and dense blue cohosh at right.**

miterwort, two-leaved toothwort, herb Robert, Canada white violet, Goldie's wood fern, ostrich fern, maidenhair fern, silvery spleenwort, plantain-leaved sedge, greater bladder sedge, thin-leaved sedge, Dewey's sedge, nodding fescue, red elderberry, and prickly gooseberry.

**Hemlock Forest**
(S4; pp. 145–147)

This community type describes a forest in which the canopy is dominated by hemlock, with very little vegetation growing in the shady understory. A few small areas along streams in the northern half of the property have a substantial hemlock component, and they would likely eventually fit this description if left undisturbed. They are otherwise similar in composition to the surrounding Northern Hardwood Forest.

**Early Successional**
(N/A; Figure 9)

This habitat type represents a current condition rather than a "natural community"—it exists on the property only because of past land use and present management. It is therefore represented on Map 1 by an overlay of the footprint of the former ski area on Northern Hardwood Forest and Lowland Spruce-Fir, which are the natural communities that would likely develop in the absence of management. Early successional habitat is characterized by dense growth of saplings, shrubs, and herbaceous vegetation. Native plant species that were found only in early successional habitat during this inventory include purple milkwort, yarrow, American burnweed, Robin's plantain fleabane, rough hawkweed, tall lettuce, early goldenrod, gray goldenrod, rough cinquefoil, spreading dogbane, common blue-eyed grass, hairy rosette-panicgrass, and path rush. Several nonnative species were also only found in this habitat: tall hawkweed, oxeye daisy, fall dandelion, red clover, white clover, cow vetch, common plantain, Oriental lady's-thumb smartweed, sheep sorrel, and Rhode Island bentgrass. Some species that were found in other habitats, such as quaking aspen, are more abundant in the early successional areas, and soft mast-producing shrubs are presumably more productive in the full sun of this habitat. Unfortunately some areas are covered by dense patches of hay-scented fern, which (in addition to reducing plant diversity) have low habitat value for most vertebrate and invertebrate wildlife.

**Figure 9: Early successional habitat with dense saplings of quaking aspen, gray birch, and red maple.**

**Seep**
(S4; pp. 303–305; Figures 10–11)

Most of the property's wetlands fall into this very broad category, which is characterized by groundwater discharge that often keeps the ground wet throughout the year. At one extreme, areas mapped as seeps include patches within Lowland Spruce-Fir forest with sphagnum carpets and scattered other wetland plants; at the other extreme, they can be large, treeless areas with deep, mucky soil and dense herbaceous vegetation. The presence of plants such as eastern rough sedge, swamp saxifrage, golden saxifrage, foamflower, water pennywort, jewelweed, and false hellebore helps to distinguish seeps from other wetland communities. Smaller seeps have been mapped as point features so that they can still be discerned on maps showing the whole property.

**Figure 10: Small seep within Lowland Spruce-Fir.**

**Figure 11: An open, marsh-like seep.**

**Shallow Emergent Marsh**
(S4; pp. 339–341; Figure 12)

Two open wetlands—one on the south side of Hamilton Hill and one near the southeast corner of the property—lack the seepage indicator species mentioned above and seem to be best classified as shallow emergent marshes, although they do include species such as sensitive fern, fringed willow-herb, nodding sedge, fowl manna grass, and drooping wood-reed, which Thomson & Sorenson associate with seeps and not with marshes. Other species present include meadowsweet, steeplebush, silky willow, virgin's bower, spotted Joe-Pye weed,

**Figure 12: Shallow Emergent Marsh on the south side of Hamilton Hill.**

purple-stemmed aster, golden ragwort, swamp candles, tall meadow rue, northern bugleweed, rough bedstraw, narrow-leaved gentian, blue flag, barber-pole bulrush, awl-fruited sedge, rice cutgrass, field horsetail, and royal fern.

**Alder Swamp**
(S5; pp. 379–381; Figure 13)

These small, speckled alder-dominated wetlands are associated with streams on either side of the VAST trail, just north of Old Hogback Road. Senstive fern is abundant, with other species including meadowsweet, steeplebush, pussy willow, purple-stemmed aster, grass-leaved goldenrod, turtlehead, golden alexanders, water avens, jewelweed, virgin's bower, dwarf raspberry, rough bedstraw, arrow-leaved tearthumb, nodding sedge, field horsetail, and marsh fern.

**Figure 13: Alder Swamp.**

**Rich Fen**
(S2; pp. 333–336; Figure 14)

There is an interesting assemblage of plants in the northern portion of the wetland on the west side of the VAST trail by the Quonset hut. In the old, anonymously made natural community map, this is partly mapped as Cattail Marsh, and the rest is unclear but presumably is the source of the "Bog/Fen," and perhaps "Sedge," appearing in the legend. I also assume this is the wetland Gulka (2015) referred to in mentioning Sedge Meadow, Dwarf Shrub Bog, and Poor Fen, as I did not find any other areas on the property that remotely resemble these communities. Neither Dwarf Shrub Bog nor Poor Fen are good fits for this wetland because both would be completely covered with sphagnum and dominated by heath shrubs. Sedge Meadow is also not a good fit because this describes a wetland dominated by one or a few sedge species, rather than a diverse mix of graminoids and other plants. I ruled out Intermediate Fen because this community is supposed to be dominated by hairy-fruited sedge (*Carex lasiocarpa*), which is absent along with most other species Thompson & Sorenson list for this community. Although the wetland is by no means a perfect fit for Rich Fen, I have labeled it as such because of the

**Figure 14: Rich Fen.**

presence of characteristic plants such as yellow-green sedge, porcupine sedge, green-keeled cottongrass, water avens, golden ragwort, and common cattail. Other plants found in this wetland that are rare or absent elsewhere in the Conservation Area include grass-leaved rush, brownish beaksedge, elliptic spikerush, pale St. John's-wort, small sundrops, bog willow-herb, round-leaved sundew, and large cranberry. Given that the fen is at the junction of several former ski trails and lifts, it has clearly been influenced by past disturbance, and it is unclear what it might have looked like before there was a ski area or how it will develop in the future.

**Stream**
(N/A; Figures 15–16)

Stream margins often have vegetation similar to what is found in seeps, and streams also often originate in seeps. Some animals, such as dusky and two-lined salamanders, are more or less exclusively found in streams, and minks spend much of their time following streams. I was surprised to also find tracks of a great blue heron in the mud of the large stream through the Lowland Spruce-Fir forest on the south side of Hamilton Hill. The three stream orders shown on the maps are based on my having followed each stream to its origin: a stream with no tributaries is a first-order stream; when two streams meet they form a second-order stream; and when two second-order streams meet they form a third-order stream.

**Figure 15: First-order stream with seepy margins.**

**Figure 16: Second-order stream.**

**Vernal Pool**
(S3; pp. 306–308; Figures 17–18)

Vernal pools are small, temporary water bodies, and unlike most natural communities they are defined mostly by what animals use them rather than what plants are present. Because vernal pools generally dry up in summer and are either isolated or have only an intermittent outflow, they do not contain fish. This makes them suitable breeding sites for spotted salamanders and wood frogs, whose eggs would otherwise be quickly devoured by fish. Every pond or puddle that was found to contain egg masses of these amphibians is shown as a vernal pool on Map 1. Some of the smaller ones are unlikely to stay wet long enough for tadpoles and salamander larvae to complete their development, but seemingly insignificant puddles can be viable breeding sites in wetter years or if they are fed by groundwater seepage. Determining the viability of each

pool would require monitoring over several years. I used the number of egg masses as a rough index of the likely importance of each pool to breeding amphibians, and the pools are numbered from 1 to 22 (on Map 1 and in Table 1) in descending order of egg mass count. A few pools just outside the Conservation Area are included so that buffers around them can be considered in future management.

**Table 1.** Vernal pools in and adjacent to Hogback Mountain Conservation Area. ID numbers correspond with those shown on Map 1. An asterisk (*) next to the number of spotted salamander egg masses indicates that spermatophores were also observed.

| Pool ID | Length (ft) | Width (ft) | Depth (feet) | Salamander | Wood Frog | Notes | Date (2018) |
|---|---|---|---|---|---|---|---|
| 1 | 170 | 55 | 2 | 288* | 100 | Open pond with peepers calling; newts, whirligig beetles; moose tracks; old beaver-cut stumps | 5/8 |
| 2 | 60 | 60 | 3 | 125* | 80 | Isolated depression w/ leaf litter bottom; caddisfly larvae & large diving beetles; fisher or fox scat on log in water | 5/8 |
| 3 | 60 | 40 | 1 | 50 | 74 | Off property; partly flooding trail; data treat this & adjacent pool to S (likely connected in some years) as single pool | 5/11 |
| 4 | 30 | 20 | 1 | 110 | 10 | Partially on Cross Mountain Trail; leaf litter bottom | 5/11 |
| 5 | 40 | 20 | 1 | 55 | 35 | Well-defined basin at edge of trail; leaf litter bottom; newts; wood frogs already hatching | 5/11 |
| 6 | 30 | 15 | 2 | 40 | 3 | On property boundary or just outside; manmade (borrow pit); leaf litter bottom; water very dark | 5/11 |
| 7 | 30 | 20 | 1 | 18 | 12 | Within larger wetland | 5/11 |
| 8 | 30 | 20 | 1 | 8 | 13 | Off property; well-defined basin, just opposite big bedrock outcrop in trail | 5/11 |
| 9 | 40 | 20 | 1 | 9* | 2 | Isolated, L-shaped pool; pit & mound topography; several smaller puddles nearby | 5/8 |
| 10 | 160 | 30 | 1 | 4* | 6 | Hemlock, winterberry; moose tracks & scat | 5/8 |
| 11 | 50 | 20 | 1 | 7 | 1 | Leaf litter bottom; meadowsweet at margin; apparent snowshoe hare sign | 5/11 |
| 12 | 30 | 18 | 1 | 8* | 0 | Isolated depression; water only ~4" deep above leaf litter | 5/8 |
| 13 | 60 | 50 | 2 | 7 | 0 | Leaf litter bottom; moose scat; eggs very fresh; whirligig beetles, water boatmen, water striders; isolated depression | 5/8 |
| 14 | 50 | 20 | 1 | 3 | 4 | Isolated depression; *Carex, Juncus, Viola* | 5/8 |
| 15 | 15 | 15 | 1 | 6 | 0 | Within larger wetland | 5/11 |
| 16 | 20 | 4 | 0 | 6 | 0 | Dried tire rut puddle | 6/21 |
| 17 | 0 | 0 | 0 | 5 | 0 | Small spring/seep with water <6" deep; MIGHT hold water long enough since it's a spring | 5/8 |
| 18 | 0 | 0 | 0 | 4 | 0 | Egg masses in muddy spot on old woods road; no water left | 6/21 |
| 19 | 40 | 20 | 1 | 2* | 1 | Isolated depression with leaf litter bottom; newts | 5/8 |
| 20 | 20 | 3 | 1 | 3 | 0 | Tire rut puddle | 5/11 |
| 21 | 20 | 15 | 1 | 1 | 0 | Small pool within large seep; moss & leaf litter bottom | 5/17 |
| 22 | 8 | 5 | 1 | 1 | 0 | Tiny pool in large seep | 5/17 |

**Figure 17: Vernal pool #5.**

**Figure 18: Vernal pool #12.**

## Flora

Approximately 290 vascular plant species were identified during this inventory. They are listed in Appendix 1, with separate columns for the three main upland forest communities, one for plants found in wetlands or along streams, and one for species found in early successional habitat (plants found only along roadsides and trails outside the mapped early successional habitat are listed in parentheses). Plant taxonomy follows Haines (2011), with a few updates: wild leeks are in the family Amaryllidaceae rather than Alliaceae; tall rattlesnake-root is in the genus *Prenanthes* rather than *Nabalus*; all species in the dogwood family are in the genus *Cornus*; and spring beauty is in the family Montiaceae rather than Portulacaceae. Plants are organized by major groups—clubmosses, ferns and horsetails, gymnosperms, monocots, and dicots—and within these groups they are alphabetized by family, genus, and species.

No protected (Threatened or Endangered) species were found, but seven are listed as uncommon (S3) in Vermont, indicating a "moderate risk of extinction/extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors (VNHI 2018). Of the 30 or so nonnative species recorded, five are highly invasive, and a few other invasive species have been noted just outside the property. Uncommon and invasive plants are shown on Map 2 and discussed below, and rare plant forms for the former are included with this report (they are also being submitted to the Vermont Nongame and Natural Heritage Program).

### Uncommon Plants

Poke milkweed (*Asclepias exaltata*; Figure 19) – A scattered, non-reproductive patch was found at the lower edge of a seep near the northern property boundary. Seventeen stems were counted, up to about four feet high. Poke milkweed is typically a species of forest openings and edges, so canopy closure may be a threat to this population, along with competition from hay-scented fern and other plants.

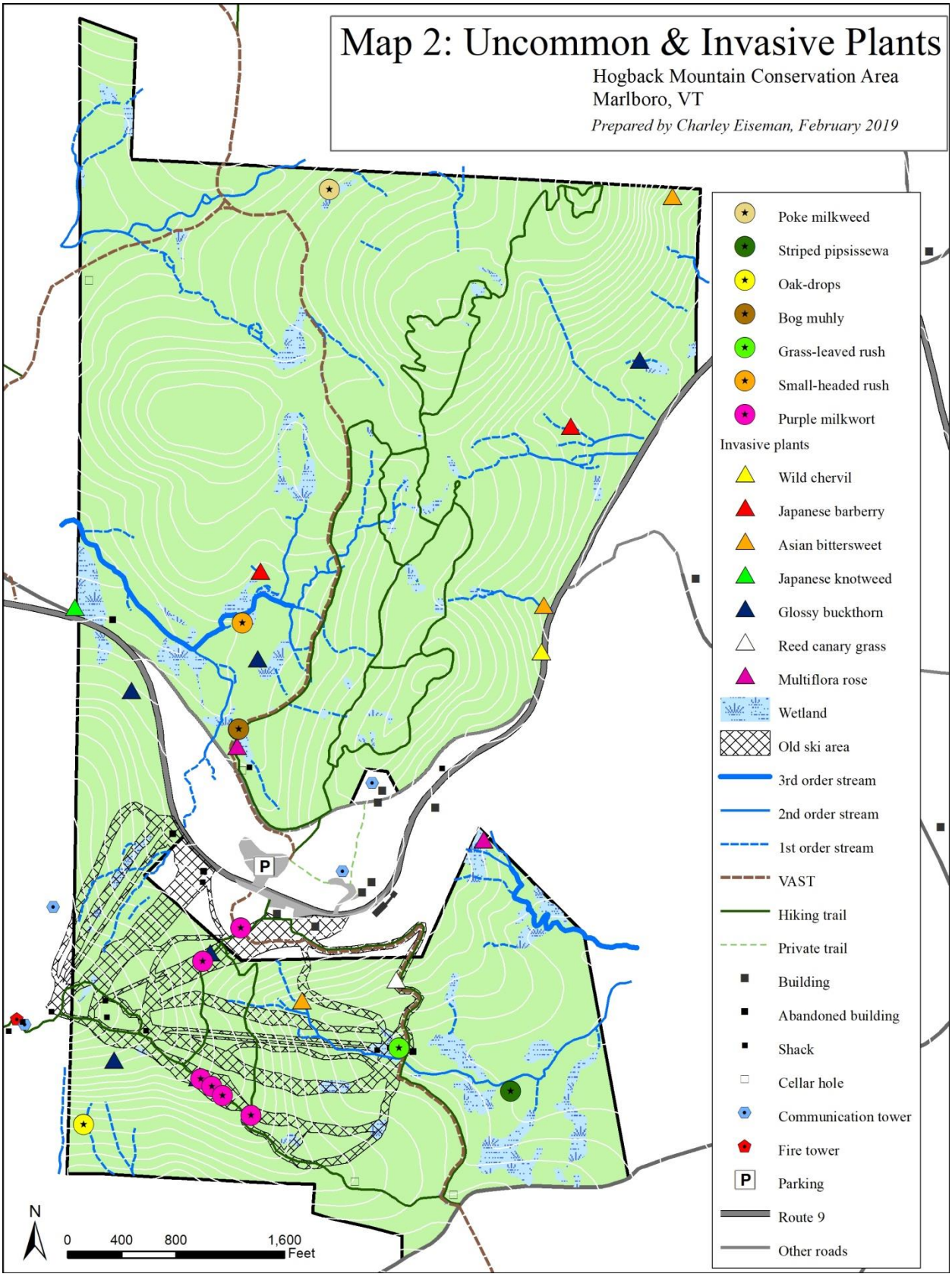

Map 2: Uncommon & Invasive Plants
Hogback Mountain Conservation Area
Marlboro, VT
Prepared by Charley Eiseman, February 2019
Poke milkweed
Striped pipsissewa
Oak-drops
Bog muhly
Grass-leaved rush
Small-headed rush
Purple milkwort
Invasive plants
Wild chervil
Japanese barberry
Asian bittersweet
Japanese knotweed
Glossy buckthorn
Reed canary grass
Multiflora rose
Wetland
Old ski area
3rd order stream
2nd order stream
1st order stream
VAST
Hiking trail
Private trail
Building
Abandoned building
Shack
Cellar hole
Communication tower
Fire tower
Parking
Route 9
Other roads
P
N
0
400
800
1,600
Feet

**Figure 19: Poke milkweed.**

**Figure 20: Striped pipsissewa.**

Striped pipsissewa (*Chimaphila maculata*; Figure 20) – A small patch (covering about 2 $m^2$) was found in a seepy, hemlocky area of the Lowland Spruce-Fir forest in the southeastern portion of the property. A few plants had immature fruits. I am used to seeing this species in more open, dry, oak-dominated forest.

Oak-drops (*Conopholis americana*; Figure 21) – This species is parasitic on oak roots. A patch covering several square meters was found under a large red oak in the Rich Northern Hardwoods forest in the southwestern portion of the property.

**Figure 21: Oak-drops.**

Small-headed rush (*Juncus brachycephalus*; Figure 22) – This species is typically found in calcareous fens, marshes, meadows, and shores. A sample I collected from the marsh on the south side of Hamilton Hill seemed to match *J. brachycephalus* best based on Haines (2011), but

the capsules were slightly larger than they should be for this species, so the identification should be checked by a botanist more familiar with rushes.

Grass-leaved rush (*Juncus marginatus*; Figure 23) – This is a plant of disturbed habitats and wetland margins. It was found in the fen by the Quonset hut, and a small number of plants were found on the VAST trail adjacent to the alder swamp. The GPS point for the latter is hidden by the Bog muhly point on Map 2.

Bog muhly (*Muhlenbergia uniflora*; Figure 24) – This is a species of disturbed habitats and various open wetlands. A few plants were found along with grass-leaved rush on the VAST trail adjacent to the alder swamp.

**Figure 22: Small-headed rush.**

**Figure 23: Grass-leaved rush.**

**Figure 24: Bog muhly.**

Purple milkwort (*Polygala sanguinea*; Figure 25) – This is another species of disturbed habitats, and in Massachusetts it is not uncommon in power line corridors. Popp et al. (2008) noted approximately 100 plants extending over about 100 feet on the Bishop Trail; I found closer to 200 plants in this area extending over 450+ feet, plus 13 more along the edge of a tire rut near the bottom of the Tower Trail, and another 50 or so in the mowed area where this trail meets the VAST trail outside the Conservation Area. It is evident that purple milkwort responds well to maintenance of the early successional habitat in conjunction with disturbance from foot traffic.

**Figure 25: Purple milkwort.**

**Invasive Plants**

Wild chervil (*Anthriscus sylvestris*) – Gulka (2015) did not find this species within the Conservation Area, but noted a patch on the north side of Route 9 about a tenth of a mile east of the western intersection of Route 9 and Old Hogback Road. I also found it only along the north side of Route 9, but the plants I found were a bit north of the eastern intersection of the two roads.

Japanese barberry (*Berberis thunbergii*) – Two large but isolated plants were found during this inventory. One was at the upper edge of a seep on the south side of Hamilton Hill, and the other was near a stream on the southeastern slope of Little Hogback.

Asian bittersweet (*Celastrus orbiculatus*) – I found three small, isolated plants, all of which I pulled up, but the locations should be monitored in case any root fragments broke off in the ground. They were found in both the northern and southern portions of the property, two along streams and one in Rich Northern Hardwoods forest.

Japanese knotweed (*Fallopia japonica*) – The only patch of Japanese knotweed encountered was just outside the western border of the property (in Wilmington), at the bottom of a pile of soil below a pullout. This location was also noted by Gulka (2015).

Glossy buckthorn (*Frangula alnus*) – Gulka (2015) found this to be the most abundant invasive species on the property. She found it along trails in the southern portion of the property (with four locations indicated on her map), and in the northern portion found one plant in a wetland and another along the forest edge of Route 9. Most plants she found were seedlings, with the exception of a mature plant near the old ski lodge. She also noted a clump found in the first early successional habitat cut that was beyond the stage where it could be pulled by hand. I did not check the specific locations noted in Gulka's report, but I found one large, flowering plant near the bottom of the Tower Trail, plus five small, isolated plants that I uprooted. The latter were in both the northern and southern portions of the property: one along the Bishop Trail; one at the edge of a seep; one along a stream; one in Rich Northern Hardwoods forest; and one in Lowland Spruce-Fir forest about 140 feet from Route 9.

Reed canary grass (*Phalaris arundinacea*) – A patch of approximately 50 stems was found in a seepy part of the VAST trail, about 200 feet into the southern portion of the property.

Multiflora rose (*Rosa multiflora*) – Two small plants were found in wet areas near the property boundaries. One was along a woods road next to an alder swamp in the northern portion, and one was in a seep near the northeast corner of the southern portion.

In addition to the above species, Gulka (2015) reported two others that were found in isolated locations and were dug or pulled up. There was a patch of common reed (*Phragmites australis*) near the Grant Road trailhead and a single clump of goutweed (*Aegopodium podagraria*) along Old Hogback Road on the east side of the property. I did not encounter either species, though I did not specifically check for them in these locations.

## Fauna

This inventory focused on vertebrate wildlife, but I recorded invertebrates sporadically and ended up listing about 100 species in each category. Vertebrate species are listed in Appendix 2, mostly following the sequence of DeGraaf & Yamasaki (2001), but with the birds following the sequence of Chesser et al. (2018). This list incorporates species reported by other observers, as noted in the far right column. Invertebrate species are listed in Appendix 3. Locations of noteworthy observations of animals (or their tracks and sign) are shown on Map 3, along with locations of overhanging ledges (mapped primarily for their importance to bobcats) and mast stands (groups of large beeches or red oaks, valuable to many species for their nut-producing potential).

### Amphibians and Reptiles

I recorded ten species of amphibians—five salamanders and five frogs—and a single reptile, the garter snake (Figures 26–31). Wetlands are critical to most of these, with two-lined and dusky salamanders living in streams, and with most others breeding in vernal pools or more permanent water bodies. Redback salamanders commonly inhabit rotting logs and stumps but can also be found under rocks and moist leaf litter. Garter snakes are likewise terrestrial but are typically found in moist areas; they can be found basking in the sunny early successional areas of Hogback Mountain Conservation Area. Northern leopard frog is only tentatively included in the list, based on a quick look I got at a spotted frog as it jumped into vernal pool #1 in May.

**Figure 26: Two-lined salamander (left) and dusky salamander (right) found under a rock in a stream.**

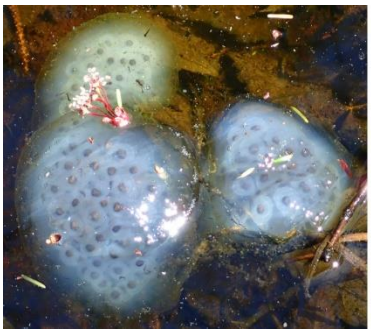


**Figure 27: Spotted salamander egg masses.**

**Figure 28: Red eft (juvenile red-spotted newt).**



**Figure 29: Wood frog egg masses.** **Figure 30: Spring peeper.** **Figure 31: Garter snake.**

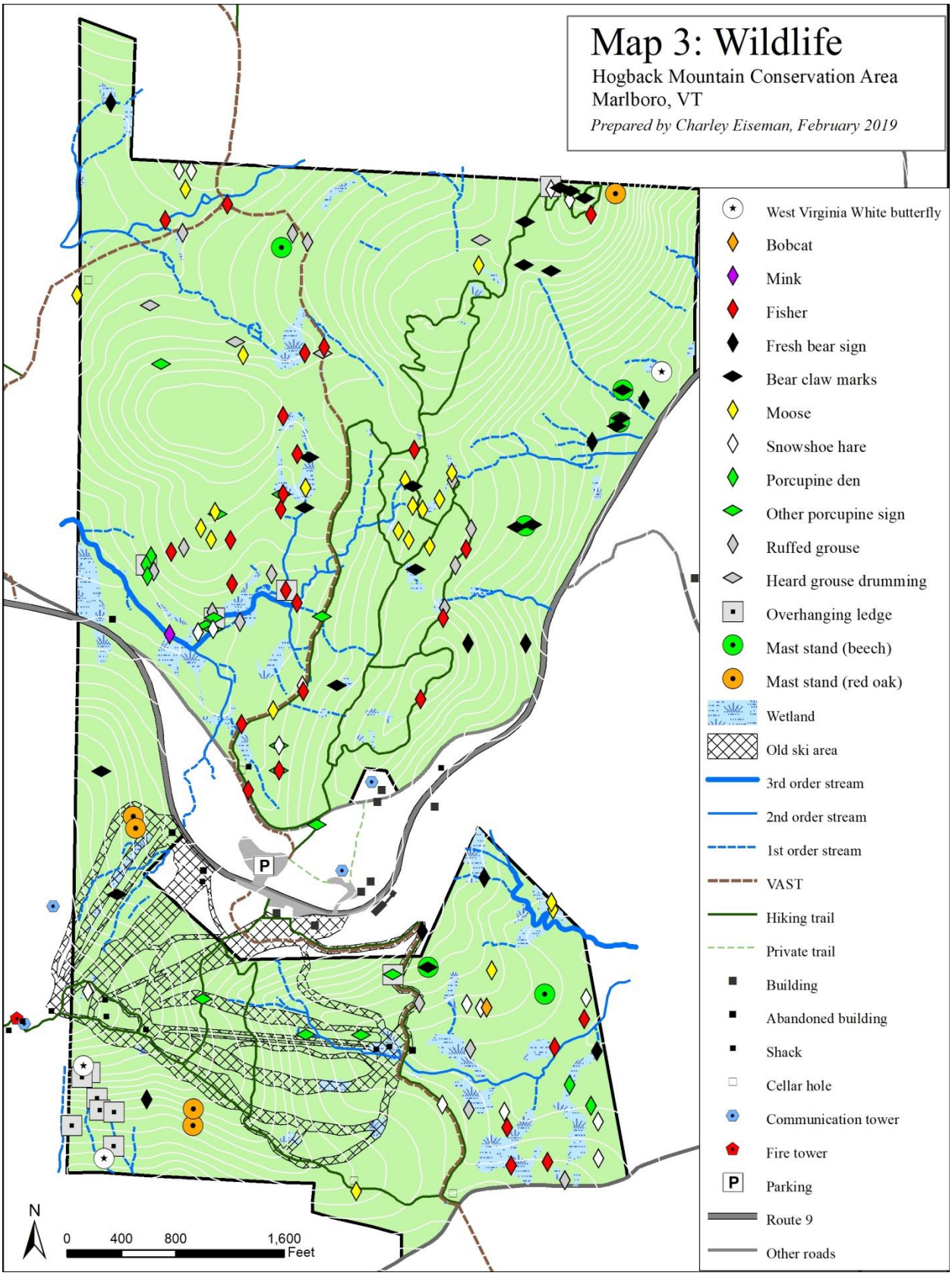
## Birds

Pooling my own bird observations with those from other sources produced a list of 80 bird species. Note that I only listed species that I saw or heard within the boundaries of the Conservation Area, whereas records from other observers include species found in the adjacent private land along Route 9 (e.g., behind the Southern Vermont Natural History Museum). Engel's (2013) list is restricted to probable nesting species, "based on a modest number of visits" between 2008 and 2013. Other records are based on more casual observations and include species observed during migration or in winter.

No protected (Threatened or Endangered) species were found, but a few are listed as uncommon (S3) in Vermont, indicating a "moderate risk of extinction/extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors" (VNHI 2017). I heard ravens calling during every month that I visited the property. According to DeGraaf & Yamasaki (2001), ravens are most common in open woodlands, clearings, and open montane forests, generally avoiding extensive, dense forests. They nest in cliffs and tall trees. Clough (2019) photographed Bohemian waxwings feeding on crabapples behind the Southern Vermont Natural History Museum in February 2009, and Hulsey & Baker (2015) netted a sharp-shinned hawk in the fall of 2015.

I included ruffed grouse observations on Map 3 because this species can be a good indicator of a well-developed understory, which is important habitat for many other birds and mammals. Grouse are also hunted by bobcat and fisher, two of the focal mammal species in this inventory. I often encountered them in dense patches of red spruce and beech saplings and at the edges of wetlands. Drumming males were heard on the north sides of Hamilton Hill and Little Hogback.

Since enhancing bird habitat is a major reason for managing the old ski area to perpetuate early successional habitat, it is worth examining the use of this area by birds. Of the twelve bird species listed by Smith (2007) as inhabiting early successional habitats and exhibiting population declines, five were observed during this inventory. One was ruffed grouse, which was encountered on both sides of Route 9 but never in the old ski area. Common yellowthroat was present from June through September so is likely breeding on the property. Singing males were mostly heard in natural wetland openings (seeps and shallow emergent marshes) on both sides of Route 9, but I did record this species in the old ski area in August. Veeries and rose-breasted grosbeaks were heard singing in May and June, mostly on the south and east sides of Hogback


Map 3: Wildlife
Hogback Mountain Conservation Area
Marlboro, VT
Prepared by Charley Eiseman, February 2019
West Virginia White butterfly
Bobcat
Mink
Fisher
Fresh bear sign
Bear claw marks
Moose
Snowshoe hare
Porcupine den
Other porcupine sign
Ruffed grouse
Heard grouse drumming
Overhanging ledge
Mast stand (beech)
Mast stand (red oak)
Wetland
Old ski area
3rd order stream
2nd order stream
1st order stream
VAST
Hiking trail
Private trail
Building
Abandoned building
Shack
Cellar hole
Communication tower
Fire tower
Parking
Route 9
Other roads
P
N
0
400
800
1,600
Feet

and Little Hogback, but each was also heard once in the ski area. Yellow-bellied sapsuckers were also heard on both sides of Route 9, including in the ski area, in May and June. I heard what I believe were begging nestlings of this species in the Rich Northern Hardwoods forest at the northeast corner of the property. Of the additional species listed by Hagenbuch (2012) as potentially benefitting from open canopy conditions (<30%) with high densities of regenerating seedlings, saplings, and shrubs, chestnut-sided warbler and white-throated sparrow were heard in May and June. The former was heard on both sides of Route 9, including in the ski area, but the latter was heard only in the northern portion of the property. Closer observation throughout the breeding season would be needed to confirm whether these and other species are successfully breeding within and outside the managed early successional habitat in the Conservation Area.

**Mammals**

Twenty-three mammal species were detected on the property during this inventory. One of these, long-tailed weasel, is ranked S3S4 (uncommon) in Vermont (VNHI 2017). In my experience tracking mammals in New England over the past 20+ years, this species goes through boom-and-bust cycles, presumably related to prey abundance, with tracks being common in some winters and scarce in others. This was definitely a good year for weasels in southern Vermont and western Massachusetts, and I found tracks crisscrossing the property during each of the three snow tracking surveys. Hunt (2016) reported catching two southern bog lemmings in the ski area, without commenting on the fact that this is a rare (S2) species. He made no mention of meadow voles, which are rather similar and are definitely present in the ski area, so I am skeptical of this record and have not included it in the list. As requested by HMCA, I mapped habitat use by the mammal species discussed below (Map 3).

Snowshoe hare (Figure 32) – This species is strongly associated with dense understory vegetation such as spruce and fir saplings. Tracks, scat, and browse were found near the northwest corner of the property; at the top of Hogback Mountain; between Hamilton Hill and Old Hogback Road; on the upper slope of Mount Olga; and throughout much of the southeastern portion of the property.

**Figure 32: Snowshoe hare activity in an area with dense spruce and fir saplings in the understory. The trails of a snowshoe hare and a ruffed grouse converge at the bottom of the photo.**

Porcupine (Figure 33) – I included this species in my mapping, in addition to the requested focal species, because porcupines have special requirements for den sites and are preyed on by fisher and bobcat. I found dens in two large, hollow trees in the southeastern portion of the property as well as in ledges on the south side of Hamilton Hill. Porcupine sign was found elsewhere in the vicinity of Hamilton Hill and in the ski area, and there may be additional dens in these areas.

**Figure 33: Porcupine scat pours from a den in a hollow yellow birch.**

**Figure 34: Tracks of a young black bear in a muddy streambank.**

**Figure 35: Old claw marks from a bear climbing a beech tree.**

Black bear (Figures 34–35) – Old claw marks on beech trunks, made by bears climbing to get at nuts in mast years, were found throughout the property. They were found most abundantly in the portion north of Route 9 and east of Hamilton Hill. Fresh bear sign was almost always found in association with wetlands and streams, which are especially important to bears seeking green vegetation to eat in early spring.

Fisher – I was unable to find definite fisher sign during the growing season, but once there was snow on the ground I found tracks throughout the northern portion of the property as well as in the southeastern corner. In my experience fishers cross open areas very rarely, and I did not find evidence of them or any of the other focal mammal species in the old ski area.

Mink – This species is associated with various wetland habitats, and in my experience spends much of its time following streams. I found mink tracks just once during this inventory, in the muddy bank of the third-order stream on the south side of Hamilton Hill in late August.

River otter – This species is typically associated with larger wetlands and streams than are present in Hogback Mountain Conservation Area, so it is not surprising that I did not encounter any otter sign during this inventory. In early February 2019, otter tracks were found not far away, near the intersection of Grant Road and Butterfield Road[1].

**Figure 36: Overhanging ledges like this one are often visited by bobcats and may be used as den sites.**

Bobcat (Figures 36–37) – I found a single bobcat scat in a thicket of spruce saplings in the southeastern portion of the property. I

[1] https://www.inaturalist.org/observations/20070059

have spent many hours trailing bobcats, and they typically zigzag among thickets of this sort (whether in forest understory or early successional habitat), beaver-created wetlands, and slopes with talus and overhanging ledges—places with abundant cover, potential den sites, and habitat for snowshoe hares, ruffed grouse, porcupines, and other prey species. There are a number of ledges of the sort that bobcats frequent in the southwest corner of the property, with a few on the south side of Hamilton Hill and one near the summit of Hogback Mountain. Some of these ledges were visited by fisher, weasel, fox, porcupine, and snowshoe hare, but I did not see any evidence of use by bobcats, nor did I find any bobcat tracks during the winter tracking surveys.

Moose (Figure 38) – I encountered moose tracks and scat frequently in the spring and summer, in much of the northern portion of the property as well as in the southeastern portion. They were usually associated with seeps and vernal pools, and sometimes in forested uplands with an abundance of saplings in the understory—all places with ample vegetation to browse. I did not see any evidence of moose or deer in the Conservation Area during the winter visits. DeGraaf & Yamasaki (2001) mention one study reporting that moose in mountainous regions generally seek lower elevations in the fall.

**Figure 37: Bobcat scat deposited on a prominent quartz rock in the middle of a spruce thicket.**

**Figure 38: Moose scat at the edge of a seep.**

## Invertebrates

Invertebrates were not a focus of this inventory, and dedicated surveys would be needed to document their diversity. I jotted down some species that I recognized on sight, and collected or photographed a few others that I was able to identify later (Figures 39–41). I ended up with a list of 94 species (Appendix 3), the composition of which reveals my focus on leafminers (and to a lesser extent gall inducers). By collecting leaf-mining larvae, rearing them to adults, and sending them to Brad Sinclair at the Canadian National Collection of Insects (CNC) for identification, I found two new host records: *Pegomya flavifrons* (Anthomyiidae) on spring beauty, and *Scaptomyza montana* (Drosophilidae) on toothwort. I also reared a few agromyzid flies, which I sent to Owen Lonsdale at the CNC, but so far he has only had a chance to identify one: *Phytomyza thermarum*, a leafminer of Robin's plantain fleabane, previously known only from British Columbia and Alberta. Other highlights included leaf mines of three agromyzid species that Owen and I formally described in 2018—*Ophiomyia parda* on calico aster, *Phytomyza tigris* on foamflower, and *P. ziziae* on golden Alexanders (Eiseman & Lonsdale 2018)—as well as

mines on hobblebush made by a moth I described with Don Davis in 2017, *Marmara viburnella* (Gracillariidae) (Eiseman et al. 2017).

**Figure 38: A male Ridings' fairy moth (*Adela ridingsella*), found in early successional habitat.**

**Figure 40: *Ceutorhynchus semirufus*, a weevil associated with Pennsylvania bittercress.**

**Figure 41: Leaf mine on foamflower made by a larva of the recently described fly *Phytomyza tigris*.**

An insect I observed that will be of interest to the non-leafminer-obsessed is a white butterfly flying in association with patches of toothwort. This may have been the West Virginia white, a state-listed species of Special Concern (S3S4), and the locations are labeled as such on Map 3. However, I was unable to get a close look at one and can't say for certain that they weren't mustard whites, another species that uses toothwort as a larval hostplant. Some were seen in the Rich Northern Hardwoods forest at the southwestern corner of the property on May 11, and at least one was seen in a seepy area southeast of Hogback Mountain on May 17. West Virginia whites have just one generation per year, so a survey to confirm the identification would need to take place during a similar time window.

A report on ticks in the Conservation Area may also be of interest. Hunt (2016) trapped 31 small mammals in the southern portion of the property in fall 2015, examining them for ticks and finding none. He noted that his professor, Alan Giese, found a single tick the following spring after dragging a cloth for 2300 meters. I checked with Alan and he confirmed that it was a black-legged (deer) tick. The only tick I encountered during the entire inventory was a dog tick I found on myself early in the day on June 8 as I explored a Rich Northern Hardwoods stand along Old Hogback Road, and I suspect that this individual came with me from Massachusetts.

On August 4–5, 2018, the Vermont Entomological Society and Cambridge Entomological Club made a joint visit to Hogback Mountain Conservation Area. Perusing their observations and verifying the identifications is beyond the scope of their report, but their results can be viewed at https://www.inaturalist.org/projects/hogback-mountain-insect-safari. Additional observations of insects and spiders on the property can be found at https://www.inaturalist.org/observations?iconic_taxa=Insecta,Arachnida&place_id=129258.

## Recommendations and Considerations

The stated objectives for the Hogback Mountain Conservation Area speak of "conservation of wildlife, aquatic and plant habitat, and scenic resources to ensure its biological health," along with recreational access and "maintenance of forest resources through long-term professional management which endeavors to minimize to the greatest extent possible any negative impact of forestry activity." "Biological health" is a subjective concept, but as I see it the only management actions needed to meet the first objective are those that seek to mitigate possible damage from human activities—which will mainly involve recreation and forestry. The property has inherent habitat diversity due to topography, numerous wetlands and streams, a mixture of deciduous and coniferous forest stands, and natural disturbance (e.g., insect damage and ice storms). Therefore I do not see a need for any habitat "enhancement," beyond perhaps measures to prevent certain rare species from disappearing from the landscape, and the main purpose of this section is to identify what to avoid when siting new trails or harvesting trees.

### Priority Species

A list of potential priority species was requested by HMCA as part of this report. Beyond state-listed rare and uncommon species, certain plants and animals can be seen as indicators that things are going well, either because they require extensive, intact natural landscapes or because they have specific habitat needs.

Mammals – HMCA has already identified several focal mammal species: moose, black bear, bobcat, otter, fisher, mink, and snowshoe hare. Otters seem unlikely to become regular visitors to the property regardless of management, unless perhaps beavers arrive and create more extensive open wetlands. I otherwise agree that this is a good list of mammals to keep in mind in managing the Conservation Area.

Herps – Spotted salamander and wood frog are the key amphibians to consider, with their dependence on vernal pools for breeding and on surrounding forested uplands for the rest of the year.

Birds – The presence of the following suite of birds on the property is indicative of extensive forest interior habitat, with both hardwood and softwood stands, as well as good vertical structure: ovenbird, black-throated blue warbler, black-throated green warbler, Blackburnian warbler, hermit thrush, wood thrush, scarlet tanager, and blue-headed vireo. Birds indicating high-quality early successional habitat include ruffed grouse, veery, rose-breasted grosbeak, common yellowthroat, chestnut-sided warbler, and white-throated sparrow—along with species not found during this inventory, such as eastern towhee, American woodcock, brown thrasher, Nashville warbler, prairie warbler, blue-winged warbler, golden-winged warbler, and mourning warbler (some of these require larger openings than are present in the Conservation Area). Cavity nesters such as pileated woodpecker, northern flicker, and yellow-bellied sapsucker are also important to consider.

Invertebrates – The West Virginia white, a state-listed species of Special Concern, relies on patches of toothwort for larval development. This plant grows in Rich Northern Hardwoods forest, along streams, and in seeps.

Plants – Numerous species occur only in wetlands or Rich Northern Hardwoods forest, and it would be arbitrary to choose any one of them to focus on. Turning to the Vermont Natural Heritage Inventory for guidance, I have identified seven state-listed uncommon species on the property and it makes sense to consider their needs. With the exception of some of the graminoids, these plants are near their northern range limit and may become more common in Vermont as the climate continues to warm. Purple milkwort is an early successional species, thriving in the disturbance caused by foot traffic on trails in the old ski area. Bog muhly and grass-leaved rush are growing in a localized wet spot on the snowmobile trail; the latter also occurs in the fen by the Quonset hut. Small-headed rush was found in a discrete area within the marsh on the south side of Hamilton Hill. The poke milkweed population is at the edge of a seep in Northern Hardwood Forest recovering from logging disturbance, and the patches of striped pipsissewa and oak-drops are in relatively undisturbed forest. Thus, most of these species either benefit from disturbance or occur in areas named in the next section.

**Priority Areas for Special Protections**

The most important areas to protect from disturbance are the Rich Northern Hardwoods stands and wetlands—including significant seeps, streams, and vernal pools. These areas have high plant diversity and are the habitats most susceptible to invasion by exotic plants. Together they also encompass all of the habitat for toothwort, the larval hostplant of the West Virginia white, and they are critical to most amphibians and to many of the priority mammal, bird, and plant species. In addition, when Rich Northern Hardwoods forest is logged, the shade-tolerant understory plants characteristic of this community are outcompeted by more aggressive, sun-loving plants. To the extent possible, logging and trails should be kept away from these areas; I would suggest a buffer of at least 100 feet for any logging that takes place. The mapped stands of mast-producing beech and oak trees should also be protected from timber harvesting. On a smaller scale, any new trails should avoid the mapped ledges and porcupine dens to protect wildlife from hikers and their dogs (and vice versa, in the case of dogs and porcupines).

**Early Successional Habitat and Timber Harvesting**

Rotating through rejuvenating the different ski slopes is a logical approach to maintaining early successional habitat given what already exists on the property. However, long, narrow openings may not provide suitable habitat for the species this management is intended to benefit, and this configuration may favor nest predators such as blue jays, crows, foxes, skunks, and raccoons. Often the only birds I heard singing in the old ski area were forest species in the strips of trees between openings, and I did not encounter any early successional species there that I did not also encounter in natural openings elsewhere on the property (and in some cases they were more common in the latter). I also did not document any of the focal mammal species using the managed early successional habitat. Perhaps timber harvesting could be used as a tool to create broader, more irregular openings in the old ski area. It would certainly be ideal if the maintenance of early successional habitat could be a byproduct of any timber harvesting that

takes place, rather than an additional operation requiring substantial time and effort from volunteers. A forester would need to be consulted to determine whether this can be done in a way that generates income for the town rather than costing money. It might make sense for it to happen in conjunction with harvesting at the south end of the property between the ski area and the VAST trail, where no sensitive features were identified.

There are also several areas in the northern portion of the property where timber harvests could take place without disturbing the sensitive areas noted above: the north and west slopes and top of Hamilton Hill; the northwest side of Little Hogback; and the area along Route 9 northeast of the Rich Northern Hardwoods stand. Canopy thinning in the second area could potentially benefit the population of poke milkweed there. The other uncommon plants associated with disturbed habitats on the north side of Route 9 are the bog muhly and grass-leaved rush growing in the snowmobile trail. Foot and vehicle traffic provide a dependable source of disturbance there, and it does not seem desirable to attempt to expand the habitat for these species in that location.

To reiterate, I do not feel that ensuring the "biological health" of the Conservation Area requires any management beyond removal of invasive species, and I make the above suggestions with the idea that *if* timber harvesting is going to occur, it should be done in a way that enhances uncommon features on the property. Much emphasis has been put on the importance of early successional habitat in recent years, but less is being said about the scarcity of unmanaged, old-growth forest in New England. Obviously, the former is easy to address by cutting down trees and has the side benefit of generating revenue, while the latter can only be addressed with time and restraint. As demand for wood products increases in the coming years, it seems likely that early successional habitat will become less scarce while undisturbed areas with large trees may become ever scarcer. There are certainly few large trees in the Conservation Area currently, and consequently few of the large snags and cavity trees that provide important habitat to many birds and mammals. If the forest is left alone, natural disturbances will continue to create canopy openings, and in contrast with timber harvesting, all of the structural complexity and nutrients from the dead wood will remain in the forest.

**Recreation**

Regarding the objective of providing access for "low-impact, low-density, non-motorized, dispersed activities," the existing trail networks are already rather dense, and the opportunities for expansion are consequently limited. In the southern portion of the property, the areas northwest and southwest of the ski area are steep and rocky (the latter also includes sensitive Rich Northern Hardwoods forest), and the area east of the VAST trail is full of wetlands and streams. In the northern portion, the area east of the existing trails is very steep (also with several patches of Rich Northern Hardwoods forest), and the south and east sides of Hamilton Hill have many wetlands and streams as well as some ledges. There may be some possibilities for new trails on the summit and north sides of Hamilton Hill and in the north-central portion of the property, although there is also value to wildlife in having some large areas that are not easily accessible to humans.

**Invasive Plant Control**

Invasive plants are remarkably sparse at Hogback Mountain Conservation Area, and it should be possible to keep them that way by:

- removing them from known locations (shown on Map 2; also see Gulka 2015) as soon as possible
- preventing disturbance (including from logging and new trails) to the areas most susceptible to invasion (wetlands, streams, and Rich Northern Hardwoods stands), and
- monitoring these susceptible areas annually, along with trails and other edges and openings.

**Future Fieldwork and Research Needs**

There are several areas where further work could be done to better understand the flora and fauna of the Conservation Area.

- I have documented breeding attempts by wood frogs and spotted salamanders in 20 vernal pools on the property, but these could be monitored throughout the spring in future years to determine which pools actually produce new frogs and salamanders. Some pools dried up too soon in 2018, but they may be viable breeding sites in wetter years.
- Breeding bird surveys could be conducted in the old ski area to assess what species are truly benefitting from the early successional habitat management. I listed the species I heard singing and calling on the property, but more detailed observation (e.g. of nests, behavior, and fledglings) is needed to fully assess the habitat's value, just as with vernal pools.
- Populations of all uncommon species could be monitored in future years; there are several that I did not thoroughly census (having not realized they were uncommon at the time I found them), and a few should be revisited to confirm their identities: West Virginia white in May; bog muhly and small-headed rush in August or September.
- Surveys focused on various invertebrate groups could also be conducted, although in terms of state-listed rare species I am not familiar enough to suggest which ones might occur on the property. We know so little about insects in general that any in-depth study is bound to produce new information, not just for the Conservation Area but for scientific knowledge in general.

## References


Ackerman, Sophie (Marlboro College student). 2015. Impacts of Brush Thatching as a Control Mechanism for "Native Invasive" Species, Hay Scented Fern. 16 pp.

Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., D. F. Stotz, B. M. Winger, and K. Winker. 2018. Check-list of North American Birds (online). American Ornithological Society. http://checklist.aou.org/taxa

Clough, Michael. 2019. Bird observations on iNaturalist. https://www.inaturalist.org/observations?place_id=129258&subview=table&iconic_taxa=Aves [accessed 25 February 2019]. Clough's observations of barred owl and tree swallow are taken from Engel (2013).

Corey, Cherrie. 2018. VT eBird checklists for Tower Trail, 14 and 19 May 2018.

DeGraaf, Richard M. and Mariko Yamasaki. 2001. *New England Wildlife*. University Press of New England, Hanover, NH. 482 pp.
Eiseman, Charles S., Donald R. Davis, Julia A. Blyth, David L. Wagner, Michael W. Palmer, and Tracy S. Feldman. 2017. A new species of *Marmara* (Lepidoptera: Gracillariidae: Marmarinae), with an annotated list of known hostplants for the genus. Zootaxa 4337(2): 198–222.
Eiseman, Charles S. and Owen Lonsdale. 2018. New state and host records for Agromyzidae (Diptera) in the United States, with the description of thirty new species. Zootaxa 4479: 1–156.
Engel, Bob. 2013. Hogback Mountain Probable Nesting Bird List. https://www.hogbackvt.org/birds-at-hogback [accessed 27 May 2018]
Gulka, Julia (Vermont Land Trust). 2015. Invasive Plant Management Plan for the Hogback Mountain Property. 7 + xv pp.
Hagenbuch, Steve (Audubon Vermont). 2012. Forest Bird Habitat Assessment: Hogback Mountain Conservation Area. 21 pp.
Haines, Arthur. 2011. *Flora Novae Angliae: A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England*. Yale University Press. 973 pp.
HMCA (Hogback Mountain Conservation Association Board of Directors). 2012. Conserving Habitat Variety in the Hogback Mountain Conservation Area (proposal to the Hogback Preservation Commission). 15 pp.
Hollertz, Liliana (Marlboro College student). 2015. Soil Micro-invertebrate Diversity and Abundance in Early, Mid, and Late Successional Habitats. 11 pp.
Hulsey, Aaron and Kayla Baker. 2015. List of birds netted at Hogback Mountain Conservation Area, August 29 – October 3, 2015. 2 pp. https://docs.wixstatic.com/ugd/dd2d73_484d264591cd49fca66e429893837564.pdf
Hunt, Connor (Lyndon State College student). 2016. Small Mammal and Tick Density Analysis in Southern Vermont. 7 pp.
Popp, R., J. Ramstetter, and Marlboro College Ecology Class. 2008. Nongame and Natural Heritage Program Survey Site Field Form. Hogback Mountain survey, 9/15/08. 3 pp.
Puhlick, Joshua (forester). 2008. Untitled partial timber cruise report. 3 pp.
Saltman, Jason. 2011. Potential vernal pools and priority search areas. [map, draft 4/19/2011]
Schiller, Amie. 2013. Natural History Internship. https://www.hogbackvt.org/introduction [accessed 9 January 2019]
Smith, Erika T. 2007. Early Successional Habitat. Fish and Wildlife Habitat Management Leaflet Number 41. 16 pp. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_022190.pdf
Thompson, Elizabeth H. and Eric R. Sorenson. 2000. *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*. University Press of New England, Hanover, NH. 456 pp.
VNHI (Vermont Natural Heritage Inventory). 2017. Rare and Uncommon Animals of Vermont. https://vtfishandwildlife.com/conserve/conservation-planning/endangered-and-threatened-species
VNHI (Vermont Natural Heritage Inventory). 2018. Rare and Uncommon Native Vascular Plants of Vermont. https://vtfishandwildlife.com/conserve/conservation-planning/plant-inventory

## Appendix 1: Vascular Plant List

NH = Northern Hardwood Forest; RNH = Rich Northern Hardwoods; LSF = Lowland Spruce-Fir; WS = Wetland/Stream; ES = Early Successional (parentheses = only found on roadsides, outside of managed early successional habitat); * = nonnative; (*) = origin uncertain; S3 = state-listed uncommon species

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| **Lycophytes** | | | | | | |
| Huperziaceae: firmoss family | | | | | | |
| *Huperzia lucidula* | shining firmoss | x | | x | x | |
| Lycopodiaceae: clubmoss family | | | | | | |
| *Dendrolycopodium dendroideum* | prickly tree-clubmoss | x | | | | |
| *Dendrolycopodium hickeyi* | Hickey's tree-clubmoss | | | x | | |
| *Dendrolycopodium obscurum* | flat-branched tree-clubmoss | x | | x | | |
| *Diphasiastrum digitatum* | southern ground-cedar | x | | x | | |
| *Lycopodium clavatum* | staghorn clubmoss | | | x | x | x |
| *Spinulum annotinum* | bristly clubmoss | x | | | | |
| | | | | | | |
| **Monilophytes** | | | | | | |
| Dennstaedtiaceae: hay-scented fern family | | | | | | |
| *Dennstaedtia punctilobula* | hay-scented fern | x | x | x | x | x |
| *Pteridium aquilinum* ssp. *latiusculum* | bracken fern | x | | | | x |
| Dryopteridaceae: wood fern family | | | | | | |
| *Dryopteris campyloptera* | mountain wood fern | | | x | x | |
| *Dryopteris carthusiana* | spinulose wood fern | x | | | x | |
| *Dryopteris cristata* | crested wood fern | | | | x | |
| *Dryopteris goldiana* | Goldie's wood fern | | x | | x | |
| *Dryopteris intermedia* | intermediate wood fern | x | | x | | |
| *Polystichum acrostichoides* | Christmas fern | x | x | | x | |
| Equisetaceae: horsetail family | | | | | | |
| *Equisetum arvense* | field horsetail | | | | x | |
| *Equisetum sylvaticum* | wood horsetail | | | | x | |
| Onocleaceae: fiddlehead fern family | | | | | | |
| *Matteuccia struthiopteris* ssp. *pensylvanica* | ostrich fern | | x | | x | |
| *Onoclea sensibilis* | sensitive fern | | | | x | x |
| Osmundaceae: royal fern family | | | | | | |
| *Osmunda claytoniana* | interrupted fern | | x | | x | |
| *Osmunda regalis* var. *spectabilis* | royal fern | | | | x | x |
| *Osmundastrum cinnamomeum* | cinnamon fern | | | | x | x |
| Pteridaceae: maidenhair fern family | | | | | | |
| *Adiantum pedatum* | northern maidenhair fern | | x | | x | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| Thelypteridaceae: marsh fern family | | | | | | |
| *Parathelypteris noveboracensis* | New York fern | x | | x | x | x |
| *Phegopteris connectilis* | long beech fern | x | x | | x | |
| *Thelypteris palustris* | marsh fern | | | | x | |
| Woodsiaceae: lady fern family | | | | | | |
| *Athyrium angustum* | narrow lady fern | | x | | x | |
| *Cystopteris tenuis* | Mackay's fragile fern | | x | | | |
| *Deparia acrostichoides* | silvery spleenwort | | x | | x | |
| | | | | | | |
| **Gymnosperms** | | | | | | |
| Pinaceae: pine family | | | | | | |
| *Abies balsamea* | balsam fir | x | | x | x | |
| *Picea rubens* | red spruce | x | | x | x | |
| *Pinus strobus* | white pine | x | x | x | | |
| *Tsuga canadensis* | eastern hemlock | x | | x | x | |
| | | | | | | |
| **Monocots** | | | | | | |
| Amaryllidaceae: amaryllis family | | | | | | |
| *Allium tricoccum* var. *tricoccum* | wild leek | | x | | | |
| Araceae: arum family | | | | | | |
| *Arisaema triphyllum* | Jack-in-the-pulpit | | x | | x | |
| Colchicaceae: colchicum family | | | | | | |
| *Uvularia sessilifolia* | sessile-leaved bellwort / wild oats | x | x | x | | |
| Cyperaceae: sedge family | | | | | | |
| *Carex appalachica* | Appalachian sedge | | x | | | |
| *Carex brunnescens* var. *sphaerostachya* | brownish sedge | | | | x | |
| *Carex cephaloidea* | thin-leaved sedge | | x | | | |
| *Carex communis* var. *communis* | fibrous-rooted sedge | x | x | | | |
| *Carex crinita* var. *crinita* | fringed sedge | | | | x | |
| *Carex debilis* var. *rudgei* | white-edged sedge | x | x | x | x | x |
| *Carex deweyana* | Dewey's sedge | | x | | | |
| *Carex disperma* | soft-leaved sedge | | | | x | |
| *Carex echinata* var. *echinata* | star sedge | | | | x | x |
| *Carex flava* | yellow-green sedge | | | | x | |
| *Carex gracillima* | graceful sedge | | x | | | |
| *Carex gynandra* | nodding sedge | x | x | | x | |
| *Carex hystericina* | porcupine sedge | | | | x | |
| *Carex intumescens* | greater bladder sedge | x | x | | x | |
| *Carex leptalea* ssp. *leptalea* | bristle-stalk sedge | | | | x | |
| *Carex leptonervia* | nerveless woodland sedge | | x | | | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| *Carex lurida* | sallow sedge | | | | x | |
| *Carex novae-angliae* | New England sedge | | | x | | |
| *Carex plantaginea* | plantain-leaved sedge | | x | | | |
| *Carex projecta* | necklace sedge | | | | x | x |
| *Carex scabrata* | eastern rough sedge | | | | x | |
| *Carex scoparia* var. *scoparia* | pointed broom sedge | | | | x | |
| *Carex stipata* var. *stipata* | awl-fruited sedge | | | | x | |
| *Carex trisperma* | three-seeded sedge | | | | x | |
| *Dulichium arundinaceum* | three-way sedge | | | | x | |
| *Eleocharis elliptica* var. *elliptica* | elliptic spikerush | | | | x | |
| *Eleocharis obtusa* var. *obtusa* | blunt spikerush | | | | x | |
| *Eriophorum viridicarinatum* | green-keeled cottongrass | | | | x | |
| *Eriophorum virginicum* | tawny cottongrass | | | | x | |
| *Rhynchospora capitellata* | brownish beaksedge | | | | x | |
| *Scirpus cyperinus* | woolly bulrush | | | | x | |
| *Scirpus hattorianus* | mosquito bulrush | | | | x | x |
| *Scirpus microcarpus* | barber-pole bulrush | | | | x | |
| Iridaceae: iris family | | | | | | |
| *Iris versicolor* | blue flag | | | | x | |
| *Sisyrinchium montanum* var. *crebrum* | common blue-eyed grass | | | | | x |
| Juncaceae: rush family | | | | | | |
| S3 *Juncus brachycephalus* | small-headed rush | | | | x | |
| S3 *Juncus marginatus* | grass-leaved rush | | | | x | |
| *Juncus pylaei* | Pylae's soft rush | | | | x | |
| *Juncus tenuis* | path rush | | | | | x |
| *Luzula multiflora* ssp. *multiflora* | common wood rush | x | | | x | x |
| Liliaceae: lily family | | | | | | |
| *Clintonia borealis* | bluebead lily | | | | x | |
| *Erythronium americanum* | trout lily | x | x | x | x | x |
| *Medeola virginiana* | Indian cucumber root | x | | | x | |
| *Streptopus lanceolatus* | lance-leaved twistedstalk | x | | | x | |
| Melanthiaceae: bunchflower family | | | | | | |
| *Veratrum viride* ssp. *viride* | false hellebore | | | | x | |
| *Trillium erectum* | red trillium | x | x | | | |
| *Trillium undulatum* | painted trillium | x | | | | |
| Orchidaceae: orchid family | | | | | | |
| *Cypripedium acaule* | pink lady's slipper | x | | x | | |
| * *Epipactis helleborine* | broad-leaved helleborine | | | | x | |
| *Platanthera* sp. | bog orchid | | | | x | |
| | | | | | | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| Poaceae: grass family | | | | | | |
| * *Agrostis capillaris* | Rhode Island bentgrass | | | | | x |
| * *Anthoxanthum odoratum* | sweet vernal grass | x | | | x | x |
| *Brachyelytrum aristosum* | northern long-awned wood grass | x | | | x | |
| *Calamagrostis canadensis* | bluejoint | | | | x | |
| *Cinna latifolia* | slender wood-reed | x | | | x | x |
| *Dichanthelium acuminatum* ssp. *fasciculatum* | hairy rosette-panicgrass | | | | | x |
| *Dichanthelium clandestinum* | deer-tongue rosette-panicgrass | | | | x | |
| *Dichanthelium* sp. | rosette-panicgrass | x | | | | |
| *Festuca subverticillata* | nodding fescue | | x | | | |
| *Glyceria canadensis* | rattlesnake manna grass | | | | x | |
| *Glyceria melicaria* | northeastern manna grass | | | | x | |
| *Glyceria striata* | fowl manna grass | | | | x | |
| *Leersia oryzoides* | rice cut grass | | | | x | |
| S3 *Muhlenbergia uniflora* | bog muhly | | | | x | |
| * *Phalaris arundinacea* | reed canary grass | | | | x | |
| *Poa palustris* | fowl bluegrass | | | | x | |
| Ruscaceae: butcher's broom family | | | | | | |
| *Maianthemum canadense* | Canada mayflower | x | | x | | |
| *Maianthemum racemosum* ssp. *racemosum* | false Solomon's seal | | x | | | |
| *Polygonatum pubescens* | hairy Solomon's seal | | x | | | |
| Typhaceae: cattail family | | | | | | |
| *Typha latifolia* | broad-leaved cattail | | | | x | |
| | | | | | | |
| **Tricolpates** | | | | | | |
| Adoxaceae: elderberry family | | | | | | |
| *Sambucus racemosa* | red elderberry | | x | | | |
| *Viburnum dentatum* var. *lucidum* | smooth arrowwood | | | | x | |
| *Viburnum lantanoides* | hobblebush | x | | | x | |
| Apiaceae: parsley family | | | | | | |
| *Aralia nudicaulis* | wild sarsaparilla | x | | | | x |
| *Heracleum maximum* | American cow-parsnip | | | | | (x) |
| *Hydrocotyle americana* | American water pennywort | | | | x | |
| *Panax trifolius* | dwarf ginseng | x | x | | | |
| *Zizia aurea* | golden Alexanders | | | | x | x |
| Apocynaceae: milkweed family | | | | | | |
| *Apocynum androsaemifolium* | spreading dogbane | | | | | x |
| S3 *Asclepias exaltata* | poke milkweed | | | | x | |
| *Asclepias syriaca* | common milkweed | | x | | | x |
| | | | | | | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| Aquifoliaceae: holly family | | | | | | |
| *Ilex verticillata* | common winterberry | | | | x | x |
| Asteraceae: aster family | | | | | | |
| *Achillea millefolium* ssp. *lanulosa* | yarrow | | | | | x |
| *Ageratina altissima* | white snakeroot | | x | | x | |
| * *Arctium* sp. | burdock | | | | x | |
| *Bidens frondosa* | Devil's beggar-ticks | | | | x | |
| *Bidens tripartita* ssp. c*omosa* | three-lobed beggar-ticks | | | | x | |
| *Doellingeria umbellata* var. *umbellata* | flat-topped aster | | | | x | x |
| *Erechtites hieraciifolius* var. *hieraciifolius* | American burnweed | | | | | x |
| *Erigeron pulchellus* var. *pulchellus* | Robin's plantain fleabane | | | | | x |
| *Eupatorium perfoliatum* | boneset | | | | x | |
| *Eurybia divaricata* | white wood-aster | x | x | | | |
| *Eurybia macrophylla* | large-leaved aster | | | | | (x) |
| *Euthamia graminifolia* | grass-leaved goldenrod | | | | x | x |
| *Eutrochium maculatum* | spotted Joe-Pye weed | | | | x | |
| * *Hieracium aurantiacum* | orange hawkweed | | | | x | x |
| *Hieracium kalmii* | Canada hawkweed | | | | x | x |
| * *Hieracium praealtum* | tall hawkweed | | | | | x |
| *Hieracium paniculatum* | panicled hawkweed | | x | | | (x) |
| *Hieracium scabrum* | rough hawkweed | | | | | x |
| * *Hieracium* sp. | hawkweed | | | | x | |
| *Lactuca biennis* | tall blue lettuce | | x | | x | x |
| *Lactuca canadensis* | tall lettuce | | | | | x |
| * *Lapsana communis* | common nipplewort | | | | x | |
| * *Leucanthemum vulgare* | oxeye daisy | | | | | x |
| *Oclemena acuminata* | whorled wood aster | x | x | | x | |
| *Packera aurea* | golden ragwort | | | | x | |
| *Prenanthes altissima* | tall rattlesnake-root | x | x | | | |
| * *Scorzoneroides autumnalis* | fall dandelion | | | | | x |
| *Solidago bicolor* | silverrod, white goldenrod | | | | | (x) |
| *Solidago caesia* | blue-stemmed goldenrod | | x | | | |
| *Solidago flexicaulis* | zigzag goldenrod | | x | | | |
| *Solidago gigantea* | smooth goldenrod | | | | x | x |
| *Solidago juncea* | early goldenrod | | | | | x |
| *Solidago nemoralis* ssp. *nemoralis* | gray goldenrod | | | | | x |
| *Solidago rugosa* ssp. *rugosa* | rough-stemmed goldenrod | | x | | x | x |
| *Symphyotrichum cordifolium* | heart-leaved aster | | | | x | x |
| *Symphyotrichum lateriflorum* | calico aster | | x | | x | x |
| *Symphyotrichum puniceum* var. *puniceum* | purple-stemmed aster | | | | x | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| * *Taraxacum officinale* | common dandelion | | x | | | |
| * *Tussilago farfara* | coltsfoot | | | | x | |
| Balsaminaceae: touch-me-not family | | | | | | |
| *Impatiens capensis* | jewelweed | | x | | x | |
| *Impatiens pallida* | pale touch-me-not | | x | | | |
| Berberidaceae: barberry family | | | | | | |
| * *Berberis thunbergii* | Japanese barberry | x | | | | |
| *Caulophyllum thalictroides* | blue cohosh | | x | | x | x |
| Betulaceae: birch family | | | | | | |
| *Alnus incana* ssp. *rugosa* | speckled alder | | | | x | |
| *Betula alleghaniensis* | yellow birch | x | x | x | x | |
| *Betula papyrifera* | paper birch | | | x | | |
| *Betula populifolia* | gray birch | | | x | x | x |
| *Corylus cornuta* ssp. *cornuta* | beaked hazelnut | x | | x | | |
| *Ostrya virginiana* | hophornbeam | x | x | | | |
| Brassicaceae: mustard family | | | | | | |
| *Cardamine diphylla* | two-leaved toothwort | | x | | x | |
| *Cardamine pensylvanica* | Pennsylvania bitter-cress | | | | x | |
| Campanulaceae: harebell family | | | | | | |
| *Lobelia inflata* | Indian tobacco | | | | x | x |
| Caprifoliaceae: honeysuckle family | | | | | | |
| *Diervilla lonicera* | bush-honeysuckle | | x | | | x |
| *Lonicera canadensis* | American fly honeysuckle | x | | | x | |
| Celastraceae: bittersweet family | | | | | | |
| * *Celastrus orbiculatus* | Asian bittersweet | | x | | x | |
| Cornaceae: dogwood family | | | | | | |
| *Cornus canadensis* | bunchberry | | | | x | x |
| *Cornus alternifolia* | alternate-leaved dogwood | | x | | x | |
| Droseraceae: sundew family | | | | | | |
| *Drosera rotundifolia* | round-leaved sundew | | | | x | |
| Ericaceae: heath family | | | | | | |
| S3 *Chimaphila maculata* | striped pipsissewa | | | x | x | |
| *Gaultheria hispidula* | creeping snowberry | | | x | x | |
| *Monotropa uniflora* | Indian-pipe | x | | | x | |
| *Pyrola elliptica* | elliptic-leaved shinleaf | | | | x | |
| *Vaccinium angustifolium* | lowbush blueberry | | | x | | x |
| *Vaccinium macrocarpon* | large cranberry | | | | x | |
| *Vaccinium myrtilloides* | velvet-leaved blueberry | | | x | | |
| Fabaceae: legume family | | | | | | |
| * *Trifolium pratense* | red clover | | | | | x |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| * *Trifolium repens* | white clover | | | | | x |
| * *Vicia cracca* ssp. *cracca* | cow vetch | | | | | x |
| Fagaceae: beech family | | | | | | |
| *Fagus grandifolia* | American beech | x | x | x | | |
| *Quercus rubra* | red oak | x | x | x | | x |
| Gentianaceae: gentian family | | | | | | |
| *Gentiana linearis* | narrow-leaved gentian | | | | x | x |
| Geraniaceae: geranium family | | | | | | |
| *Geranium robertianum* | herb Robert | | x | | x | |
| Grossulariaceae: gooseberry family | | | | | | |
| *Ribes cynosbati* | prickly gooseberry | | x | | | |
| *Ribes glandulosum* | skunk currant | | x | | x | |
| Hypericaceae: St. Johnswort family | | | | | | |
| *Hypericum canadense* | lesser St. John's-wort | | | | x | x |
| *Hypericum ellipticum* | pale St. John's-wort | | | | x | |
| Lamiaceae: mint family | | | | | | |
| * *Galeopsis bifida* | split-lipped hemp-nettle | | | | x | x |
| *Lycopus uniflorus* | northern bugleweed | | | | x | |
| *Mentha canadensis* | American wild mint | | | | x | |
| * *Prunella vulgaris* ssp. *vulgaris* | common selfheal | | | | x | |
| *Scutellaria lateriflora* | mad dog skullcap | | | | x | |
| Malvaceae: mallow family | | | | | | |
| *Tilia americana* | American basswood | | x | | | |
| Montiaceae: miner's lettuce family | | | | | | |
| *Claytonia caroliniana* | Carolina spring beauty | x | x | x | x | |
| Myrsinaceae: colicwood family | | | | | | |
| *Lysimachia borealis* | starflower | x | | x | | |
| *Lysimachia ciliata* | fringed loosestrife | | | | | (x) |
| *Lysimachia terrestris* | swamp candles | | | | x | |
| Oleaceae: olive family | | | | | | |
| *Fraxinus americana* | white ash | x | x | x | x | x |
| Onagraceae: evening-primrose family | | | | | | |
| *Circaea alpina* ssp. *alpina* | small enchanter's nightshade | | | | x | |
| *Epilobium ciliatum* | fringed willow-herb | | | | x | |
| *Epilobium leptophyllum* | bog willow-herb | | | | x | |
| *Oenothera perennis* | small sundrops | | | | x | |
| Orobanchaceae: broom-rape family | | | | | | |
| S3 *Conopholis americana* | American squaw-root / oak-drops | | x | | | |
| *Epifagus virginiana* | beechdrops | x | | | | |
| | | | | | | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| Oxalidaceae: wood sorrel family | | | | | | |
| *Oxalis montana* | mountain wood sorrel | x | | | x | |
| *Oxalis stricta* | common yellow wood sorrel | | | | x | x |
| Papaveraceae: poppy family | | | | | | |
| *Dicentra canadensis* | squirrelcorn | | x | | | |
| Plantaginaceae: snapdragon family | | | | | | |
| *Chelone glabra* | white turtlehead | | | | x | |
| * *Plantago major* | common plantain | | | | | x |
| * *Veronica officinalis* | common speedwell | | | | x | |
| *Veronica scutellata* | marsh / narrow-leaved speedwell | | | | x | |
| *(*) Veronica serpyllifolia* | thyme-leaved speedwell | | | | x | |
| Polygalaceae: milkwort family | | | | | | |
| S3 *Polygala sanguinea* | purple milkwort | | | | | x |
| Polygonaceae: buckwheat family | | | | | | |
| *Fallopia cilinodis* | fringed bindweed | x | x | x | x | x |
| * *Persicaria hydropiper* | water-pepper smartweed | | | | x | |
| * *Persicaria longiseta* | Oriental lady's-thumb smartweed | | | | | x |
| *Persicaria sagittata* | arrow-leaved tearthumb | | | | x | |
| *Persicaria* sp. | smartweed | | | | x | |
| * *Rumex acetosella* ssp. *pyrenaicus* | sheep sorrel | | | | | x |
| * *Rumex obtusifolius*ssp. *obtusifolius* | bitter dock | | | | | (x) |
| Ranunculaceae: buttercup family | | | | | | |
| *Actaea pachypoda* | white baneberry | x | x | | x | |
| *Anemone quinquefolia* var. *quinquefolia* | wood anemone | | | | x | |
| *Aquilegia canadensis* | red columbine | x | x | | | |
| *Clematis virginiana* | virgin's bower | | x | | x | |
| *Coptis trifolia* | goldthread | | | x | x | |
| *Ranunculus abortivus* | kidney-leaf buttercup | | x | | | |
| * *Ranunculus acris* | tall buttercup | | | | x | x |
| *Ranunculus recurvatus* var. *recurvatus* | hooked crowfoot | | x | | x | |
| * *Ranunculus repens* | creeping buttercup | | | | x | |
| *Thalictrum pubescens* | tall meadow rue | | | | x | |
| Rhamnaceae: buckthorn family | | | | | | |
| * *Frangula alnus* | glossy buckthorn | | | x | x | x |
| Rosaceae: rose family | | | | | | |
| *Amelanchier laevis* | smooth shadbush | | | | | x |
| *Amelanchier* sp. | shadbush | x | | | x | x |
| *(*) Crataegus* sp. | hawthorn | | | | x | x |
| *Fragaria virginiana* ssp. *virginiana* | wild strawberry | | | | x | x |
| *Geum rivale* | water avens | | | | x | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| *Potentilla norvegica* | rough cinquefoil | | | | | x |
| *Potentilla simplex* | common cinquefoil | | | x | x | x |
| *Prunus pensylvanica* var. *pensylvanica* | pin cherry | | | | x | x |
| *Prunus serotina* var. *serotina* | black cherry | x | | | | |
| *Prunus virginiana* var. *virginiana* | choke cherry | | | | x | |
| * *Rosa multiflora* | multiflora rose | | | | x | |
| *Rubus canadensis* | smooth blackberry | | | | x | |
| *Rubus flagellaris* | northern dewberry | | | | x | |
| *Rubus hispidus* | swamp dewberry | | | | x | |
| *Rubus idaeus* ssp. *strigosus* | red raspberry | | x | x | x | |
| *Rubus occidentalis* | black raspberry | | | | x | |
| *Rubus odoratus* | purple-flowering raspberry | | x | | x | |
| *Rubus pubescens* | dwarf raspberry | | | | x | |
| *Rubus setosus* | setose blackberry | | | | x | |
| *Rubus vermontanus* | Vermont blackberry | | | | | x |
| *Rubus* sp. | blackberry | x | | | x | |
| *Sorbus americana* | American mountain-ash | | | x | x | |
| *Spiraea alba* var. *latifolia* | meadowsweet | | x | | x | x |
| *Spiraea tomentosa* | steeplebush | | | | x | x |
| Rubiaceae: madder family | | | | | | |
| *Galium asprellum* | rough bedstraw | | | | x | |
| *Galium palustre* | marsh bedstraw | | | | x | |
| *Galium tinctorium* var. *tinctorium* | stiff three-petaled bedstraw | | | | x | |
| *Galium triflorum* | fragrant bedstraw | | x | | x | |
| *Houstonia caerulia* | little bluet | x | | | x | x |
| *Mitchella repens* | partridgeberry | x | | | | |
| Salicaceae: willow family | | | | | | |
| *Populus tremuloides* | quaking aspen | | | x | | x |
| *Salix bebbiana* | long-beaked willow | | | | x | x |
| *Salix discolor* | pussy willow | | | | x | x |
| *Salix sericea* | silky willow | | | | x | |
| *Salix* sp. | willow | | | | x | x |
| Sapindaceae: soapberry family | | | | | | |
| *Acer pensylvanicum* | striped maple | x | x | x | | |
| *Acer rubrum* | red maple | x | | x | x | x |
| *Acer saccharum* | sugar maple | x | x | x | | |
| *Acer spicatum* | mountain maple | | | | x | |
| Saxifragaceae: saxifrage family | | | | | | |
| *Chrysosplenium americanum* | golden saxifrage | | | | x | |
| *Micranthes pensylvanica* | swamp saxifrage | | | | x | |

| | | NH | RNH | LSF | WS | ES |
|---|---|---|---|---|---|---|
| *Micranthes virginiensis* | early saxifrage | | x | | | |
| *Mitella diphylla* | two-leaved miterwort | | x | | | |
| *Tiarella cordifolia* | foamflower | | x | | x | |
| Solanaceae: nightshade family | | | | | | |
| * *Solanum dulcamara* | bittersweet nightshade | | | | x | |
| Urticaceae: nettle family | | | | | | |
| *Laportea canadensis* | wood nettle | | x | | x | |
| *Pilea pumila* | Canada clearweed | | | | x | |
| Violaceae: violet family | | | | | | |
| *Viola blanda* var. *palustriformis* | sweet white violet | | | | x | |
| *Viola canadensis* | Canada white violet | | x | | | |
| *Viola cucullata* | blue marsh violet | | | | x | |
| *Viola pallens* | smooth white violet | | x | | x | |
| *Viola pubescens* | downy yellow violet | | x | x | | |
| *Viola rotundifolia* | round-leaved violet | x | x | | | |
| *Viola sororia* | common blue violet | | | | | x |

## Appendix 2: Vertebrate Wildlife List

May–Jan = observed by Charley Eiseman in 2018–19.
Ref. = other observers: 1 = Engel (2013); 2 = Hulsey & Baker (2015); 3 = Corey (2018); 4 = Hunt (2016); 5 = Puhlick (2008); 6 = Clough (2019).

| Common Name | Latin Name | May | Jun | Aug | Sep | Dec | Jan | Ref. |
|---|---|---|---|---|---|---|---|---|
| **Amphibians & Reptiles** | | | | | | | | |
| Spotted salamander | *Ambystoma maculatum* | x | x | | | | | |
| Red-spotted newt | *Notophthalmus viridescens* | x | x | | x | | | |
| Northern dusky salamander | *Desmognathus fuscus* | x | | | | | | |
| Northern two-lined salamander | *Eurycea bislineata* | x | | | x | | | |
| Redback salamander | *Plethodon cinereus* | x | | | | | | |
| Spring peeper | *Pseudacris crucifer* | x | x | | x | | | |
| Green frog | *Lithobates clamitans* | | | x | | | | |
| Wood frog | *Lithobates sylvaticus* | x | | | x | | | |
| Northern leopard frog | *Lithobates pipiens* | ? | | | | | | |
| Pickerel frog | *Rana palustris* | | | x | x | | | |
| Garter snake | *Thamnophis sirtalis* | x | | | x | | | |
| **Birds** | | | | | | | | |
| Mallard | *Anas platyrhynchos* | | | | | | | 6 |
| Ruffed grouse | *Bonasa umbellus* | x | | | x | x | x | 1,3,5,6 |
| Mourning dove | *Zenaida macroura* | | | | | | | 1 |
| Yellow-billed cuckoo | *Coccyzus americanus* | | | | | | | 2 |
| Black-billed cuckoo | *Coccyzus erythropthalmus* | | | x | | | | |
| Ruby-throated hummingbird | *Archilochus colubris* | | | | | | | 2 |
| American woodcock | *Scolopax minor* | | | | | | | 2 |
| Great blue heron | *Ardea herodias* | | | x | | | | |
| Turkey vulture | *Cathartes aura* | x | | | | | | 3 |
| Sharp-shinned hawk | *Accipiter striatus* | | | | | | | 2 |
| Red-shouldered hawk | *Buteo lineatus* | | x | | | | | |
| Broad-winged hawk | *Buteo platypterus* | x | x | x | x | | | 1 |
| Red-tailed hawk | *Buteo jamaicensis* | | | | | | | 3 |
| Barred owl | *Strix varia* | x | | | x | | | 6 |
| Yellow-bellied sapsucker | *Sphyrapicus varius* | x | x | | | | | 1 |
| Downy woodpecker | *Picoides pubescens* | | | | | | x | 2 |
| Hairy woodpecker | *Picoides villosus* | x | x | x | x | | x | 1 |
| Northern flicker | *Colaptes auratus* | | | x | | | | 1,2 |
| Pileated woodpecker | *Dryocopus pileatus* | x | | x | x | x | x | 1 |
| American kestrel | *Falco sparverius* | | | | | | | 6 |
| Eastern wood-pewee | *Contopus virens* | | x | | | | | 1 |
| Alder flycatcher | *Empidonax alnorum* | | | | | | | 1,2[2] |
| Least flycatcher | *Empidonax minimus* | | x | | | | | 2 |
| Eastern phoebe | *Sayornis phoebe* | x | | | | | | 1,2 |
| Great crested flycatcher | *Myiarchus crinitus* | | | | | | | 1 |
| Yellow-throated vireo | *Vireo flavifrons* | | | | | | | 3 |

[2] Hulsey & Baker reported "Traill's Flycatcher"; may indicate Alder Flycatcher or Willow Flycatcher.

| Common Name | Latin Name | May | Jun | Aug | Sep | Dec | Jan | Ref. |
|---|---|---|---|---|---|---|---|---|
| Blue-headed vireo | *Vireo solitarius* | x | x | | | | | 1,2 |
| Philadelphia vireo | *Vireo philadelphicus* | | | | | | | 2 |
| Red-eyed vireo | *Vireo olivaceus* | x | x | x | x | | | 1,2,3,6 |
| Blue jay | *Cyanocitta cristata* | x | x | x | x | | | 1,2,6 |
| American crow | *Corvus brachyrhynchos* | | | x | x | | | 6 |
| Common raven | *Corvus corax* | x | x | x | x | x | x | 5 |
| Tree swallow | *Tachycineta bicolor* | | | | | | | 6 |
| Barn swallow | *Hirundo rustica* | | | | | | | 1 |
| Black-capped chickadee | *Poecile atricapillus* | x | x | x | x | x | x | 1,2 |
| Tufted titmouse | *Baeolophus bicolor* | | | | | | | 1 |
| Red-breasted nuthatch | *Sitta canadensis* | x | x | x | x | | | 1,2,3 |
| White-breasted nuthatch | *Sitta carolinensis* | x | | x | x | | | 1,3 |
| Brown creeper | *Certhia americana* | x | | x | x | | | 1 |
| Winter wren | *Troglodytes hiemalis* | x | x | x | | | | 1 |
| Golden-crowned kinglet | *Regulus satrapa* | x | x | | x | x | | 1,2 |
| Ruby-crowned kinglet | *Regulus calendula* | x | | | | | | 2 |
| Veery | *Catharus fuscescens* | x | x | | | | | 1,2 |
| Swainson's thrush | *Catharus ustulatus* | | | | | | | 2 |
| Hermit thrush | *Catharus guttatus* | x | x | x | | | | 1,2 |
| Wood thrush | *Hylocichla mustelina* | x | x | | | | | 1,2,3 |
| American robin | *Turdus migratorius* | x | x | x | x | | | 1,2,3 |
| Gray catbird | *Dumetella carolinensis* | | x | | | | | 2 |
| Bohemian waxwing | *Bombycilla garrulus* | | | | | | | 6 |
| Cedar waxwing | *Bombycilla cedrorum* | | x | x | x | | | 1,2 |
| Purple finch | *Haemorhous purpureus* | | ? | | | | | 1,3 |
| American goldfinch | *Spinus tristis* | x | | x | x | | | 1,6 |
| Snow bunting | *Plectrophenax nivalis* | | | | | | | 6 |
| Chipping sparrow | *Spizella passerina* | | | | | | | 3 |
| Song sparrow | *Melospiza melodia* | | x | x | x | | | 1,3 |
| White-throated sparrow | *Zonotrichia albicollis* | x | x | | | | | 1,2 |
| Dark-eyed junco | *Junco hyemalis* | x | x | | x | | | 1,2,3 |
| Red-winged blackbird | *Agelaius phoeniceus* | | | | | | | 1,3 |
| Ovenbird | *Seiurus aurocapilla* | x | x | x | x | | | 1,2 |
| Black-and-white warbler | *Mniotilta varia* | x | x | | | | | 2,3 |
| Tennessee warbler | *Oreothlypis peregrina* | | | | | | | 2 |
| Nashville warbler | *Oreothlypis ruficapilla* | | | | | | | 2,3 |
| Common yellowthroat | *Geothlypis trichas* | | x | x | x | | | 1,2,3 |
| American redstart | *Setophaga ruticilla* | | | | | | | 2,3 |
| Northern parula | *Setophaga americana* | | | | | | | 2 |
| Magnolia Warbler | *Setophaga magnolia* | | ? | | | | | 1,2 |
| Bay-breasted warbler | *Setophaga castanea* | | | | | | | 2 |
| Blackburnian warbler | *Setophaga fusca* | x | x | | | | | 2,3 |
| Chestnut-sided warbler | *Setophaga pensylvanica* | x | x | | | | | 1,2,3,6 |
| Blackpoll warbler | *Setophaga striata* | | | | | | | 2 |
| Black-throated blue warbler | *Setophaga caerulescens* | x | x | | x | | | 1,2,3 |
| Palm warbler | *Setophaga palmarum* | | | | | | | 2 |
| Pine warbler | *Setophaga pinus* | | | | | | | 3 |

| Common Name | Latin Name | May | Jun | Aug | Sep | Dec | Jan | Ref. |
|---|---|---|---|---|---|---|---|---|
| Yellow-rumped warbler | *Setophaga coronata* | x | | | | | | 1,3 |
| Hermit warbler | *Setophaga occidentalis* | | | | | | | 2 |
| Black-throated green warbler | *Setophaga virens* | x | x | | | | | 1,2,3 |
| Canada warbler | *Cardellina canadensis* | | | | | | | 2 |
| Scarlet tanager | *Piranga olivacea* | x | x | | | | | 1,3 |
| Rose-breasted grosbeak | *Pheucticus ludovicianus* | x | x | | | | | 1,3 |
| Indigo bunting | *Passerina cyanea* | | ? | | | | | 1 |
| **Mammals** | | | | | | | | |
| Shrew | Soricidae | | | | | | x | |
| Masked shrew | *Sorex cinereus* | | | | | | x | |
| Snowshoe hare | *Lepus americanus* | x | | | | x | x | 5 |
| Eastern chipmunk | *Tamias striatus* | x | x | | x | | | |
| Red squirrel | *Tamiasciurus hudsonicus* | x | x | | x | x | x | |
| Flying squirrel | *Glaucomys* sp. | | | | | x | x | |
| Beaver | *Castor canadensis* | (old stumps by big vernal pool) | | | | | | |
| White-footed mouse | *Peromyscus* sp. | | | | | x | x | 4 |
| Vole | Cricetidae | x | | x | | x | | |
| Jumping mouse | Zapodidae | | | x | | | | 4 |
| Porcupine | *Erethizon dorsatum* | x | x | x | | | x | |
| Coyote | *Canis latrans* | ? | | | | | x | 5 |
| Red fox | *Vulpes vulpes* | ? | | | ? | x | | |
| Gray fox | *Urocyon cinereoargenteus* | | | | | x | x | |
| Black bear | *Ursus americanus* | x | x | | | | | |
| Raccoon | *Procyon lotor* | x | x | x | x | | | |
| Fisher | *Pekania pennanti* | ? | | | | x | x | |
| Ermine | *Mustela erminea* | | | | | | x | |
| Long-tailed weasel | *Mustela frenata* | | | | | x | x | |
| Mink | *Neovison vison* | | | x | | | | |
| Bobcat | *Lynx rufus* | x | | | | | | |
| White-tailed deer | *Odocoileus virginianus* | x | x | | x | x | | |
| Moose | *Alces alces* | x | x | | | | | |

## Appendix 3: Invertebrate List

| Order | Family | Genus | Species | Date | Notes |
|---|---|---|---|---|---|
| Arachnids | | | | | |
| Ixodida | Ixodidae | *Dermacentor* | *variabilis* | 6/8/2018 | single tick on me; likely brought from home |
| Insects | | | | | |
| Coleoptera | Cerambycidae | *Glycobius* | *speciosus* | 5/8/2018 | old larval feeding sign |
| Coleoptera | Cerambycidae | *Monochamus* | | 9/7/2018 | larva heard chewing in balsam fir wood |
| Coleoptera | Chrysomelidae | *Chalepus* | *walshii* | 6/21/2018 | feeding on Canada bluejoint |
| Coleoptera | Chrysomelidae | *Sumitrosis* | *inaequalis* | 6/19/2018 | leafminer on Asteraceae |
| Coleoptera | Coccinellidae | *Chilocorus* | *stigma* | 5/8/2018 | |
| Coleoptera | Curculionidae | *Ceutorhynchus* | *semirufus* | 6/8/2018 | found on Pennsylvania bittercress |
| Coleoptera | Curculionidae | *Xyloterinus* | *politus* | 5/8/2018 | on beech |
| Coleoptera | Dytiscidae | | | 5/8/2018 | in vernal pool |
| Coleoptera | Gyrinidae | | | 5/8/2018 | in vernal pool |
| Coleoptera | Megalopodidae | *Zeugophora* | | 9/5/2018 | leafminer on quaking aspen |
| Coleoptera | Staphylinidae | *Ontholestes* | *cingulatus* | 6/21/2018 | |
| Coleoptera | Tenebrionidae | *Bolitotherus* | *cornutus* | 12/12/2018 | egg masses on Ganoderma |
| Diptera | Agromyzidae | *Agromyza* | | 8/23/2018 | leafminer on slender wood-reed |
| Diptera | Agromyzidae | *Cerodontha* | *angulata* | 8/27/2018 | leafminer on deertongue grass |
| Diptera | Agromyzidae | *Cerodontha* | *?incisa* | 9/9/2018 | leafminer on slender wood-reed |
| Diptera | Agromyzidae | *Liriomyza* | *limopsis* | 6/21/2018 | leafminer on white wood aster |
| Diptera | Agromyzidae | *Liriomyza* | *orilliensis* | 8/10/2018 | leaf miner on rattlesnake-root |
| Diptera | Agromyzidae | *Ophiomyia* | *congregata* | 8/10/2018 | leaf miner on rattlesnake-root |
| Diptera | Agromyzidae | *Ophiomyia* | *parda* | 9/5/2018 | leafminer on calico aster |
| Diptera | Agromyzidae | *Ophiomyia* | | 9/5/2018 | stem miners on tall lettuces & hawkweeds |
| Diptera | Agromyzidae | *Phytomyza* | *agromyzina* | 6/19/2018 | leafminer on bunchberry |
| Diptera | Agromyzidae | *Phytomyza* | *aralivora* | 6/21/2018 | leafminer on wild sarsaparilla |
| Diptera | Agromyzidae | *Phytomyza* | *crassiseta* | 9/5/2018 | leafminer on common speedwell |
| Diptera | Agromyzidae | *Phytomyza* | *thermarum* | 6/21/2018 | mining leaves of Robin's plantain fleabane |
| Diptera | Agromyzidae | *Phytomyza* | *tigris* | 5/11/2018 | leaf mine on foamflower |
| Diptera | Agromyzidae | *Phytomyza* | *ziziae* | 6/19/2018 | leafminer on golden Alexanders |
| Diptera | Agromyzidae | *Phytomyza* | | 6/19/2018 | mining leaves of grass-leaved goldenrod |
| Diptera | Anthomyiidae | *Chirosia* | *filicis* | 6/21/2018 | larvae mining cinnamon fern fronds |
| Diptera | Anthomyiidae | *Chirosia* | *gleniensis* | 6/19/2018 | larvae mining sensitive fern fronds |
| Diptera | Anthomyiidae | *Pegomya* | *flavifrons* | 5/11/2018 | reared from leaf mines on spring beauty |
| Diptera | Anthomyiidae | *Pegomya* | | 6/8/2018 | larvae mining fringed bindweed leaves |
| Diptera | Bombyliidae | *Bombylius* | *major* | 5/8/2018 | |

| Order | Family | Genus | Species | Date | Notes |
|---|---|---|---|---|---|
| Diptera | Cecidomyiidae | *Acericecis* | *ocellaris* | 6/8/2018 | leaf spot galls on red maple |
| Diptera | Cecidomyiidae | *Asteromyia* | *carbonifera* | 8/10/2018 | leaf spot galls on goldenrod |
| Diptera | Cecidomyiidae | *Asteromyia* | *euthamiae* | 9/7/2018 | leaf spot galls on grass-leaved goldenrod |
| Diptera | Cecidomyiidae | *Asteromyia* | *modesta* | 8/10/2018 | leaf spot galls on goldenrod |
| Diptera | Cecidomyiidae | *Harmandia* | | 9/5/2018 | leaf galls on quaking aspen |
| Diptera | Cecidomyiidae | *Rhopalomyia* | *pedicellata* | 9/7/2018 | galls on grass-leaved goldenrod |
| Diptera | Cecidomyiidae | *Schizomyia* | *impatientis* | 8/10/2018 | flowerbud galls on jewelweed |
| Diptera | Drosophilidae | *Scaptomyza* | *montana* | 6/8/2018 | larvae mining toothwort leaves |
| Diptera | Limoniidae | *Chionea* | | 12/12/2018 | snow fly (a wingless crane fly) |
| Diptera | Scathophagidae | *Parallelomma* | *vittatum* | 6/21/2018 | larvae mining lady's slipper leaves |
| Diptera | Tabanidae | *Chrysops* | | 6/8/2018 | |
| Hemiptera | Adelgidae | *Pineus* | *similis* | 5/8/2018 | old galls on red spruce |
| Hemiptera | Coccidae | *Pulvinaria* | *innumerabilis* | 8/10/2018 | on striped maple |
| Hemiptera | Corixidae | | | 5/8/2018 | in vernal pool |
| Hemiptera | Eriococcidae | *Cryptococcus* | *fagisuga* | 5/8/2018 | |
| Hemiptera | Gerridae | | | 5/8/2018 | in vernal pool |
| Hymenoptera | Andrenidae | *Andrena (Melandrena)* | | 5/8/2018 | visiting trout lily flowers |
| Hymenoptera | Andrenidae | *Andrena* | *erigeniae* | 5/11/2018 | visiting spring beauty flowers |
| Hymenoptera | Argidae | *Sterictiphora* | | 6/8/2018 | larva feeding on black cherry leaves |
| Hymenoptera | Ichneumonidae | *Megarhyssa* | *greenei* | 6/19/2018 | |
| Hymenoptera | Tenthredinidae | *Caliroa* | | 9/9/2018 | larvae on red oak leaves |
| Hymenoptera | Tenthredinidae | *Eutomostethus* | *luteiventris* | 9/5/2018 | borer/miner in rush stems |
| Hymenoptera | Tenthredinidae | *Metallus* | *rohweri* | 9/5/2018 | leafminer on blackberry |
| Hymenoptera | Tenthredinidae | *Nefusa* | *ambigua* | 6/21/2018 | larvae mining violet leaves |
| Hymenoptera | Tenthredinidae | *Pseudodineura* | *fuscula* | 6/8/2018 | mining leaves of creeping buttercup |
| Lepidoptera | Adelidae | *Adela* | *ridingsella* | 6/21/2018 | |
| Lepidoptera | Bucculatricidae | *Bucculatrix* | *pomifoliella* | 8/27/2018 | leafminer on black cherry |
| Lepidoptera | Bucculatricidae | *Bucculatrix* | *sexnotata* | 9/9/2018 | leafminer on white wood aster |
| Lepidoptera | Coleophoridae | *Coleophora* | | 5/17/2018 | feeding on beech |
| Lepidoptera | Elachistidae | *Elachista* | | 6/8/2018 | mining leaves of Carex communis |
| Lepidoptera | Erebidae | *Orgyia* | *definita* | 9/7/2018 | cocoon |
| Lepidoptera | Geometridae | *Lambdina* | *fiscellaria* | 8/23/2018 | hemlock looper |
| Lepidoptera | Gracillariidae | *Acrocercops* | *astericola* | 6/19/2018 | leafminer on grass-leaved goldenrod |
| Lepidoptera | Gracillariidae | *Cameraria* | | 9/5/2018 | leafminers on oak, hophornbeam, sugar maple |
| Lepidoptera | Gracillariidae | *Marmara* | *?fasciella* | 5/8/2018 | bark mines on balsam fir & hemlock |
| Lepidoptera | Gracillariidae | *Marmara* | *viburnella* | 9/7/2018 | leaf and stem miner on hobblebush |
| Lepidoptera | Gracillariidae | *Marmara* | | 5/17/2018 | bark mines on red maple |
| Lepidoptera | Gracillariidae | *Phyllocnistis* | *insignis* | 5/17/2018 | leaf mines on golden ragwort |
| Lepidoptera | Gracillariidae | *Phyllocnistis* | *populiella* | 9/5/2018 | leafminer on quaking aspen |

| Order | Family | Genus | Species | Date | Notes |
|---|---|---|---|---|---|
| Lepidoptera | Gracillariidae | *Phyllocnistis* | | 6/21/2018 | larvae mining silky willow leaves |
| Lepidoptera | Gracillariidae | *Phyllonorycter* | *maestingella* | 5/8/2018 | leaf mines on beech |
| Lepidoptera | Gracillariidae | *Phyllonorycter* | | 9/5/2018 | leafminer on quaking aspen |
| Lepidoptera | Heliozelidae | *Antispila* | *freemani* | 8/27/2018 | leafminer on bunchberry |
| Lepidoptera | Heliozelidae | *Coptodisca* | | 9/5/2018 | leafminer on quaking aspen |
| Lepidoptera | Incurvariidae | *Paraclemensia* | *acerifoliella* | 5/11/2018 | |
| Lepidoptera | Lasiocampidae | *Malacosoma* | *americana* | 6/8/2018 | caterpillars defoliating black cherry sapling |
| Lepidoptera | Nepticulidae | *Acalyptris* | | 9/9/2018 | stem miner on elliptic spikerush |
| Lepidoptera | Nepticulidae | *Ectoedemia* | *populella* | 9/5/2018 | petiole galls on quaking aspen |
| Lepidoptera | Nepticulidae | *Ectoedemia* | *rubifoliella* | 9/5/2018 | leafminer on dewberry |
| Lepidoptera | Nepticulidae | *Glaucolepis* | *saccharella* | 9/7/2018 | leafminer on sugar maple |
| Lepidoptera | Nepticulidae | *Stigmella* | *populetorum* | 9/5/2018 | leafminer on quaking aspen |
| Lepidoptera | Nepticulidae | *Stigmella* | *quercipulchella* | 9/5/2018 | leafminer on red oak |
| Lepidoptera | Nepticulidae | *Zimmermannia* | | 5/17/2018 | bark mines on paper birch |
| Lepidoptera | Nymphalidae | *Danaus* | *plexippus* | 9/5/2018 | visiting flowers in early successional habitat |
| Lepidoptera | Nymphalidae | *Limenitis* | *arthemis* | 6/19/2018 | red-spotted purple |
| Lepidoptera | Papilionidae | *Papilio* | *canadensis* | 6/8/2018 | |
| Lepidoptera | Pieridae | *Pieris* | *?virginiensis* | 5/11/2018 | flying near toothwort |
| Lepidoptera | Stathmopodidae | *Stathmopoda* | *aenea* | 8/23/2018 | larvae feeding on New York & lady fern spores |
| Lepidoptera | Thyrididae | *Thyris* | *maculata* | 6/19/2018 | adult in marsh (larvae feed on Virgin's bower) |
| Mecoptera | Panorpidae | *Panorpa* | | 8/23/2018 | |
| Trichoptera | Limnephilidae | *Limnephilus* | | 5/8/2018 | "log cabin" caddisfly larva in vernal pool |