ECOLOGICAL INVENTORY AND STEWARDSHIP PLAN

for

SHARON TOWN FOREST

SHARON, NEW HAMPSHIRE

Prepared for:

Sharon Conservation Commission

Respectfully submitted by:

Moosewood Ecological LLC

Innovative Conservation and Land Management Solutions

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INTRODUCTION

At the request of the Town of Sharon Conservation Commission, Moosewood Ecological, LLC conducted an ecological inventory of Robert P. Bass Memorial Town Forest, henceforward referred to as 'Sharon Town Forest' within this report. In consultation with the Conservation Commission, our ecological inventory was designed to develop a well-rounded understanding of the property's natural resources, significant ecological features, and biodiversity. Our findings and recommendations are provided to assist the Conservation Commission in stewarding this important property for generations to come.

SITE DESCRIPTION

Sharon Town Forest covers 891 acres in central Sharon, just west of State Route NH-123 (Figure 1). The town of Sharon itself lies in southwestern Hillsborough County in southern New Hampshire and occupies part of the Contoocook River's eastern flank on the slopes of the Wapack Range. The Contoocook River flows northward from the neighboring town of Jaffrey all the way to the City of Concord, where it merges with the Merrimack River. Sharon is a small and sparsely populated town with fewer than 400 residents, and like many New Hampshire communities, its people value the towns rural character. The Sharon Town Forest stands at a testament to the town's long-term commitment to maintain this identify – approximately 9% of Sharon is conserved by the Town Forest alone. Conservation easements protect lands on over two dozen other parcels in the town.

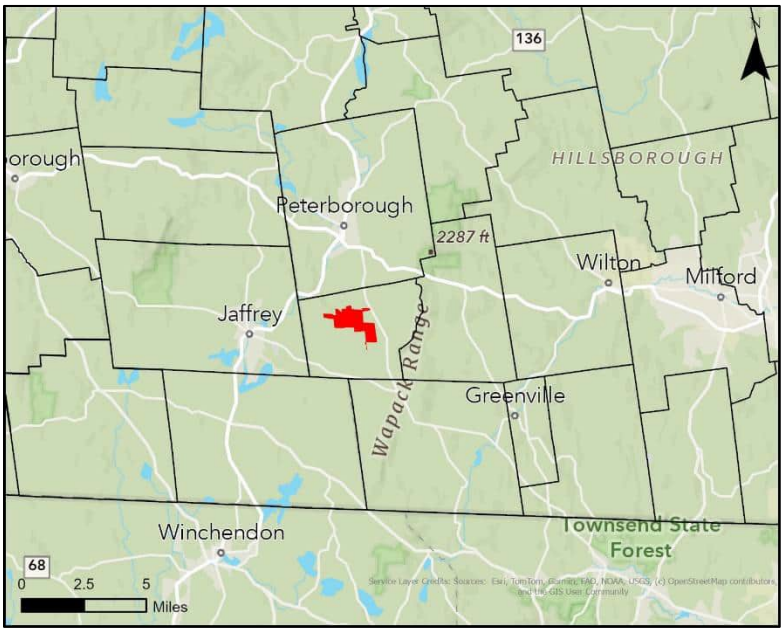

Figure 1. Locus map of Sharon Town Forest (red).

The property offers a variety of recreational opportunities from hiking to hunting, nature observation, and education. Periodic timber harvests provide a source of income for the Town. Fires, trapping, and use of motorized vehicles are prohibited at Sharon Town Forest, whereas hunting and fishing are allowed with State of New Hampshire permits. Roughly 7.3 miles of trails span the property, and nearly the entire length of Meadow Brook through the Town Forest can be followed by taking the Meadow Brook Trail, Sullivan Loop, and Matthews Trail. Visitors primarily access the property directly via the Sullivan Loop trailhead on McCoy Road, the Meadow Brook Trail entrance off NH-123, or the Big Tree Trail entrance off Jarmany Hill Road. Other access points are the Street Street Trail at the end of Milt Street (private road off Jarmany Hill Road) and the Matthews Trail that starts near the site where Meadow Brook crosses Spring Hill Road. Most of Sharon Town Forest's Trails were developed in part by an AmeriCorps project in 1996, and new bridges across Meadow Brook were created in 2008 and 2009. Since

this time, volunteers under the direction of the Sharon Conservation Commission have worked to keep the trails maintained.

Following the initial 659-acre acquisition of Sharon Town Forest in 1975 and its designation as a Town Forest in 1976, at least 970,000 board feet of timber were harvested between 1977 and 1979. By 1990, Sharon Town Forest had expanded to 870 acres and a New England Forestry Foundation (NEFF) report estimated the property contained 4.5 million board feet of marketable timber. This NEFF report characterized the forest as "pole-sized hardwoods that regenerated after the 1938 hurricane and 1939 fire." The next harvest occurred between 2002 and 2006 removing about 280,000-300,000 board feet from west of Meadow Brook, and the most recent timber harvest created six small clear-cuts along the Sullivan Loop Trail and east of Meadow Brook. While most of the property's forest represents fairly even-aged stands, these post-1939 logging events have introduced structural diversity at the landscape scale, thereby improving overall wildlife habitat and diversity. Additionally, the 1996 natural resources inventory of Sharon Town Forest observed a small amount of older-growth forest that survived the 1938 hurricane, 1939 fire, and possibly also woodlot clearing by early European settlers in the area.

Despite a long history of natural disturbances and timber harvests, a current-day bird's-eye view reveals dense forest cover, a necklace of wetlands adorning Meadow Brook, and six prominent patches of shrubland that regenerated following a timber harvest in 2012 (Figure 2). Eastern white pine (*Pinus strobus*) and eastern hemlock (*Tsuga canadensis*), two conifer species, dominate Sharon Town Forest's canopy, especially within the Meadow Brook drainage and nearby slopes. Higher up, on the topographic shoulders of the property, hardwoods become more common, forming large stands of mixed hardwoods and conifers with eastern white pine, eastern hemlock, maples (*Acer* spp.), oaks (*Quercus* spp.), and birches (*Betula* spp.).

When viewed using color-infrared wavelengths, wetland and impervious surfaces may be more apparent to the human eye. The Town Forest lacks any impervious surfaces, and the property's minimal road frontage likely suffers few impacts from road salts and chemicals transported by rainwater runoff. Throughout the center of the property, Meadow Brook stands out as a dark blue string connecting light-colored emergent and shrub wetlands (Figure 3). To the trained eye, multiple vernal pools within Sharon Town Forest's southwestern corner stand out as dark blue dimples. Had this color infrared image not been collected before the hardwoods tree leafed out or before snow had melted, these isolated pools would have been obscured.

PURPOSE OF THE PLAN

The overall purpose of this ecological inventory and stewardship plan is to provide guidance regarding the protection of Sharon Town Forest's natural resources, including biological diversity, while preserving the existing trail system and working forest landscape of the property. The primary goal of this plan was to assess the current condition of the property to help guide the implementation of management activities that benefit the following stewardship strategies.

- Maintenance of soil productivity;
- Protection of water quality, wetlands and riparian areas;
- Maintenance or enhancement of wildlife habitat;

- Maintenance or enhancement of the overall quality of the forest;
- Diversification of age classes to promote a healthy balance of early, mid, and late successional forest stands to support overall biodiversity;
- Protection of unique or fragile natural areas;
- Protection of unique historic or cultural features; and
- Conservation of native plant and animal species, and natural communities; and
- Incorporation of the effects of climate change to promote ecological resilience for long-term health.

COMMUNITY OUTREACH AND ENGAGEMENT – SHARON TOWN FOREST BIOBLITZ

In line with the Sharon Conservation Commission's commitment to public outreach and engagement surrounding the town's natural resources, the Conservation Commission hosted a community iNaturalist training and bioblitz event. iNaturalist is an "online social network of people sharing biodiversity information to help each other learn about nature" (iNaturalist.org). The platform crowdsources species sightings into an international database used widely by educators, scientists, and conservationists. The training held on 25 June 2024 at the Town Offices guided participants through the user-friendly process of share observations of flora and fauna with the iNaturalist database.

After a couple of weeks for community members to practice on their own after the training, the Conservation Commission organized a bioblitz event on 6 July 2024 at the Sharon Town Forest to contribute to the broader ecological inventory project. A bioblitz is a communal effort to document as many species as possible within a specific geographic area over a short period of time, often 24 hours. The event ran from 8am to 4pm, during which time seven participants contributed 579 observations of 335 species to the Sharon Town Forest Biodiversity Project – the property's established project within the iNaturalist database. Data collected from the bioblitz generated a snapshot of the Town Forest's early-July biodiversity, which can be compared to observations made in future years, including to assess local phenological impacts from climate change.

A bioblitz participant uses iNaturalist to document common milkweed and pollinators.

As of April 2025, the Sharon Town Forest Biodiversity Project[1] has collected 2,904 observations of 709 species. Ten iNaturalist users have participated by sharing sightings, while 333 iNaturalist users have helped identify the species photographed. Existing and future datapoints collected within the project are publicly accessible for research, species monitoring, education, and inspiring deeper connections with nature.

[1] Accessible online at https://www. inaturalist.org/projects/sharon-town-forest-biodiversity-project

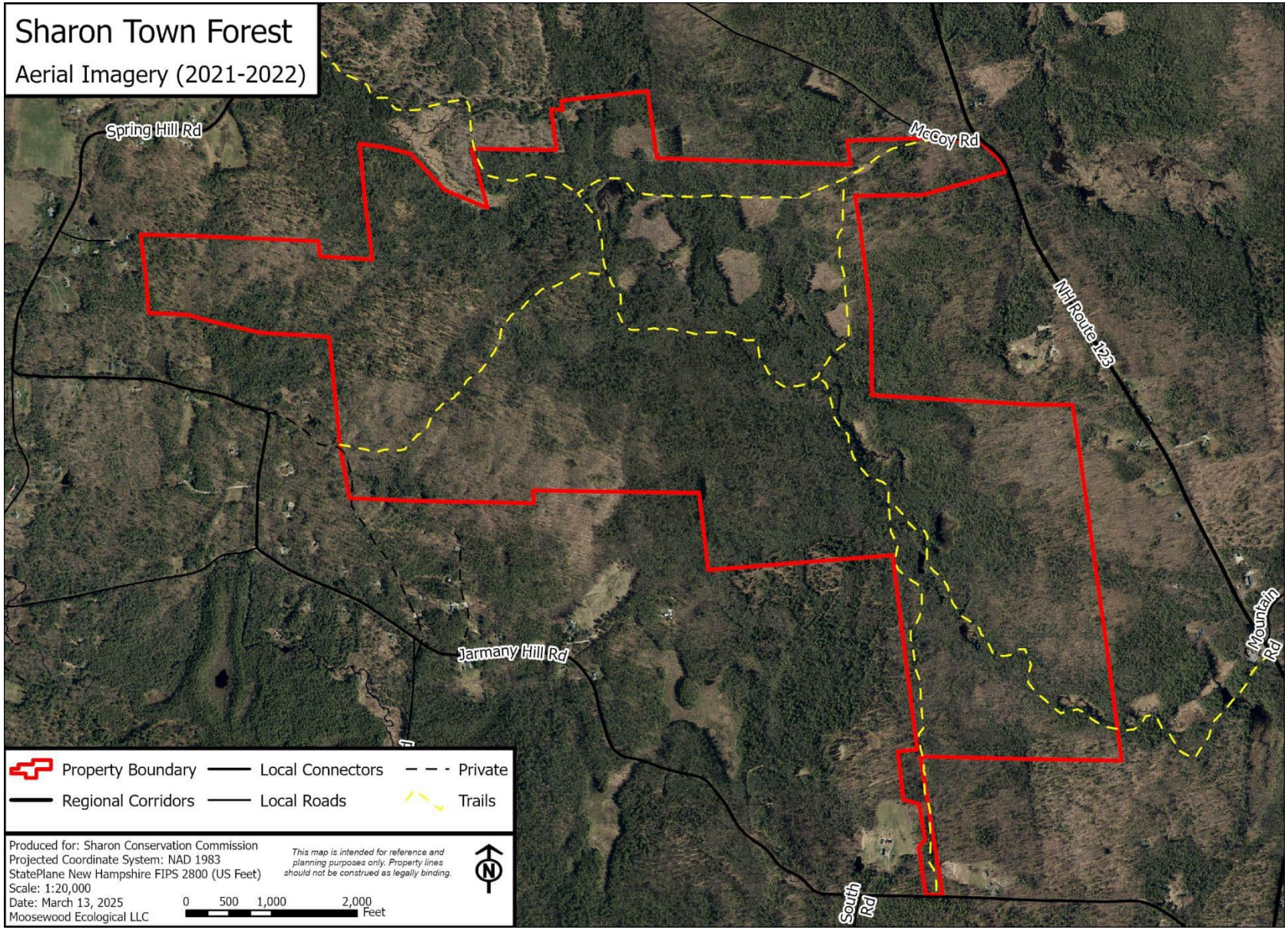

Figure 2. Aerial imagery map of Sharon Town Forest.

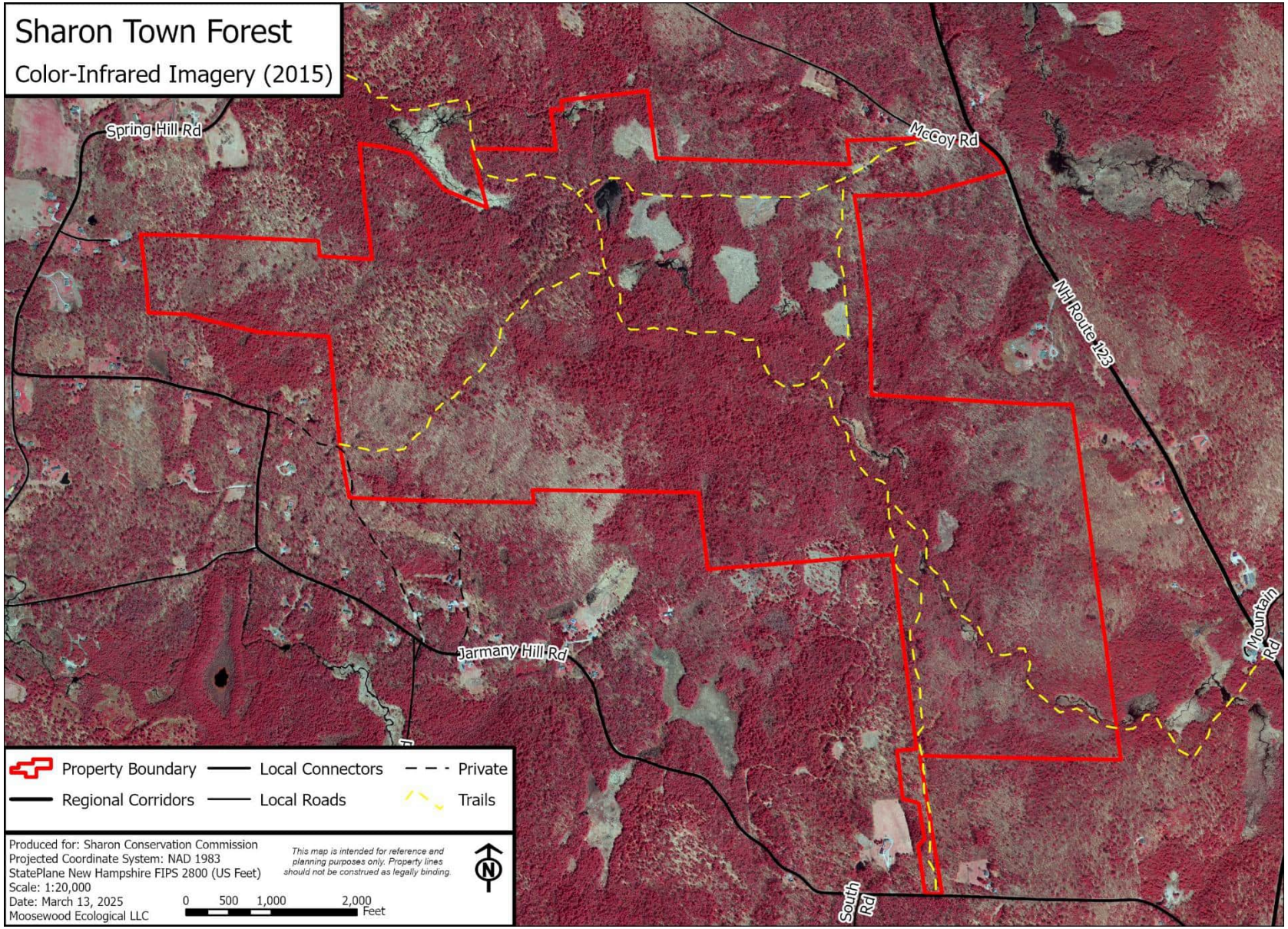

Figure 3. Color-infrared imagery map of Sharon Town Forest

METHODS

While much of the information in this report stemmed from data collected on-site, several available data sources aided in our assessment of the property's landscape setting and ecological connectivity. Prior to field surveys, we conducted a desktop analysis in ArcGIS Pro 3.3 to locate natural features of particular interest. Digital datasets and resources used for analysis, mapping, or otherwise complementing our field surveys included:

- Assessment of the Sharon Town Forest Hemlock Looper Damage (Corwin, 2023)
- Natural Resource Inventory of the Sharon Town Forest (Van de Poll, 1996)
- Robert P. Bass Memorial Forest Management Plan (Corwin and Fields, 2007)
- Natural Resources Conservation Service soils dataset
- New Hampshire GRANIT bedrock geology formations
- New Hampshire Fish and Game wildlife corridor model
- New Hampshire Conservation and Public Lands
- New Hampshire Fish and Game State Wildlife Action Plan
- New Hampshire GRANIT aerial and color-infrared imagery
- New Hampshire GRANIT digital parcel dataset for Hillsborough County
- New Hampshire GRANIT LiDAR-derived digital elevation model
- New Hampshire Natural Heritage Bureau rare species and natural communities
- Sharon Town Forest Chronology (Sharon Conservation Commission, 2019)
- Sharon Town Forest Logging History (Sharon Conservation Commission, 2023)
- The Nature Conservancy's Conservation Gateway geodata portal (various datasets)
- Town of Sharon Master Plan (2020)
- United States Fish and Wildlife Service's National Wetlands Inventory (NWI) Plus dataset
- United States Geological Survey (USGS) National Hydrography Dataset
- USGS topographic quadrangles

Following the establishment of a geographic information system (GIS) database for Sharon Town Forest and an initial synthesis of existing information, Moosewood Ecological designed a series of inventory methods that targeted species of conservation concern, wildlife habitats, natural communities, invasive plants, and forest pathogens. Field surveys occurred between April and October, 2024 to optimize detection of species of conservation concern while still experiencing the property in most seasons. At-risk species, as well as wide-roaming species that depend on connected landscapes, act as telling indicators of an area's ecological heath, or integrity. Field surveys also sought to corroborate large-scale habitats mapped by the New Hampshire Wildlife Action Plan, as well as identify and map fine-scale wildlife habitats (e.g., vernal pools, den sites, etc.), exemplary/unique natural communities, invasive plants, forest pathogens (e.g., Beech Bark Disease), and ecologically sensitive areas.

During each visit, Moosewood Ecological recorded all significant observations of wildlife and plants, sometimes using taxon-specific techniques. Breeding birds were sampled via systematic surveys following standard point-count protocols, whereas mammals were primarily sampled with strategically placed camera traps. Amphibians and reptiles were surveyed from spring through summer with an emphasis on vernal pools, streams, and wetlands. Plants, natural communities, and forest pathogens were also surveyed from spring through autumn.

Incidental observations of invertebrates and other organisms were recorded throughout the project's duration. All observations of wildlife, as well as unique, rare, or invasive plants were noted throughout field work, including both visual and auditory observations whenever organisms could be confidently identified. Other signs such as feeding stations, browsing, tracks, scat, and scent stations were also noted. GPS units and digital cameras were used to record primarily significant ecological features, species occurrences, and the site's overall natural beauty.

GEOLOGY, TOPOGRAPHY, AND SOILS

The bedrock underlying Sharon Town Forest consists primarily of metamorphic rocks associated with the Rangeley Formation, sections of which have been mapped from Massachusetts to western Maine. The Rangely Formation's origins trace back 444 to 419 million years to when seafloor sediment was compacted at the bottom of a deep basin within the ancient Iapetus Ocean. After hundreds of millions of years of uplifting, erosion, faulting, and other tectonic activity, these marine sedimentary rocks were subjected to intense heat and pressure, metamorphizing the bedrock's chemical makeup and positioning the layer to its modern-day location. According to the *Bedrock Geologic Map of New Hampshire* (Lyons et al., 1997), most of Sharon Town Forest rests atop The Rangely Formation's "Member C" unit, which is characterized as a rusty-weathering clay-rich schist and metamorphosed sandstone, which can be coarse-grained in places. Relatively small pods, or lenses, of bedrock containing calcium- and silica-rich minerals occur occasionally. The southern third of the southeastern corner of Sharon Town Forest contains similar bedrock associated with "Member B" of the Rangeley Formation. In steeper sections of Meadow Brook through this area, exposed bedrock presents a gray, thinly-layered, weakly-metamorphosed, and clay-rich sandstone. Bedrock pods rich in calcium and silica nutrients are uncommon. The scarce availability of calcium in these metamorphosed rocks partly limits the available nutrients to flora at the Town Forest, thus offering plants more acidic growing conditions.

Multiple periods of glaciation significantly altered this landscape, and the Laurentide Ice Sheet that occupied modern-day New Hampshire until 13,000 years ago put many of the finishing touches on Sharon Town Forest's topography. Bedrock scraped away by the glacier's enormous weight now buries much of the property's bedrock in a blanket of glacial till – unsorted clays, silts, sands, gravel, cobble, and boulders. Till deposits in some areas east of Meadow Brook may reach an estimated 60 feet in depth, whereas till across the rest of the property is likely 20 feet thick or less. Along Meadow Brook, stream-deposited alluvial sediments, primarily silt and sand, have accumulated since the retreat of the glacier, and mucky post-glacial swamp deposits formed in low-lying areas depressions. These ancient riverine and

swamp wetlands, potentially thousands-of-years-old, significantly contribute to the range of growing conditions present at Sharon Town Forest.

Topographically, Sharon Town Forest is defined by the Meadow Brook drainage, which flows northwestward from the southeast corner to its exit in the center of the northern property line. From a high point of about 1,320 feet above sea level at the eastern trailhead along Jarmany Hill Road, the property gradually slopes downward to a low point of approximately 890 feet where a minor tributary of Meadow Brook flows across the northern boundary (Figure 4). Except for low-lying areas associated with Meadow Brook, the property contains moderate slopes mostly less than 15%. However, several steep hillsides and infrequent ledges present slopes exceeding 35% when calculated from a high-resolution LiDAR elevation dataset (Figures 5 and 6). East of Meadow Brook, the Town Forest's slope face generally west, southwest, and south, offering plants warmer and drier growing conditions than the cooler, moister slopes with north, northeast, or east-facing aspects to the west of Meadow Brook. This variation in the unique combinations of slope and aspect generates a broad spectrum of landforms. Modeling by The Nature Conservancy depicts eight landform types at Sharon Town Forest (Figure 7), each of which contain their associated flora and fauna.

During the thousands of years since the last glacier retreated, environmental and biological processes gradually developed a range of soil types influenced by the property's Rangely Formation bedrock, overlaying glacial till, and topography. Soil data from the Natural Resources Conservation Service (NRCS), a branch of the United States Department of Agriculture, displays twenty different soil types existing at Sharon Town Forest (Figure 8, Table 1). Except for poorly- and very-poorly drained soils in the wetlands associated with Meadow Brook, the uplands consist primarily of moderately-well to well-drained stony, gravely, or sandy till-derived soils. Where deeper organic loams have developed west of Meadow Brook and close to Jarmany Hill Road and NH-123, modest suitability for agricultural cultivation exists.

The scale at which the NRCS mapped soil types poorly predicts minute wetlands, including vernal pools, seeps, and small forested or shrub wetlands with poorly drained soils. Indeed, Sharon Town Forest's many vernal pools and wet pockets documented by other datasets and field-based observations are not reflected by the NRCS soil data. Despite these shortcomings, these soil data help generally characterize the property's soil texture and wetness, adding another layer of information to the site's overall ecological setting.

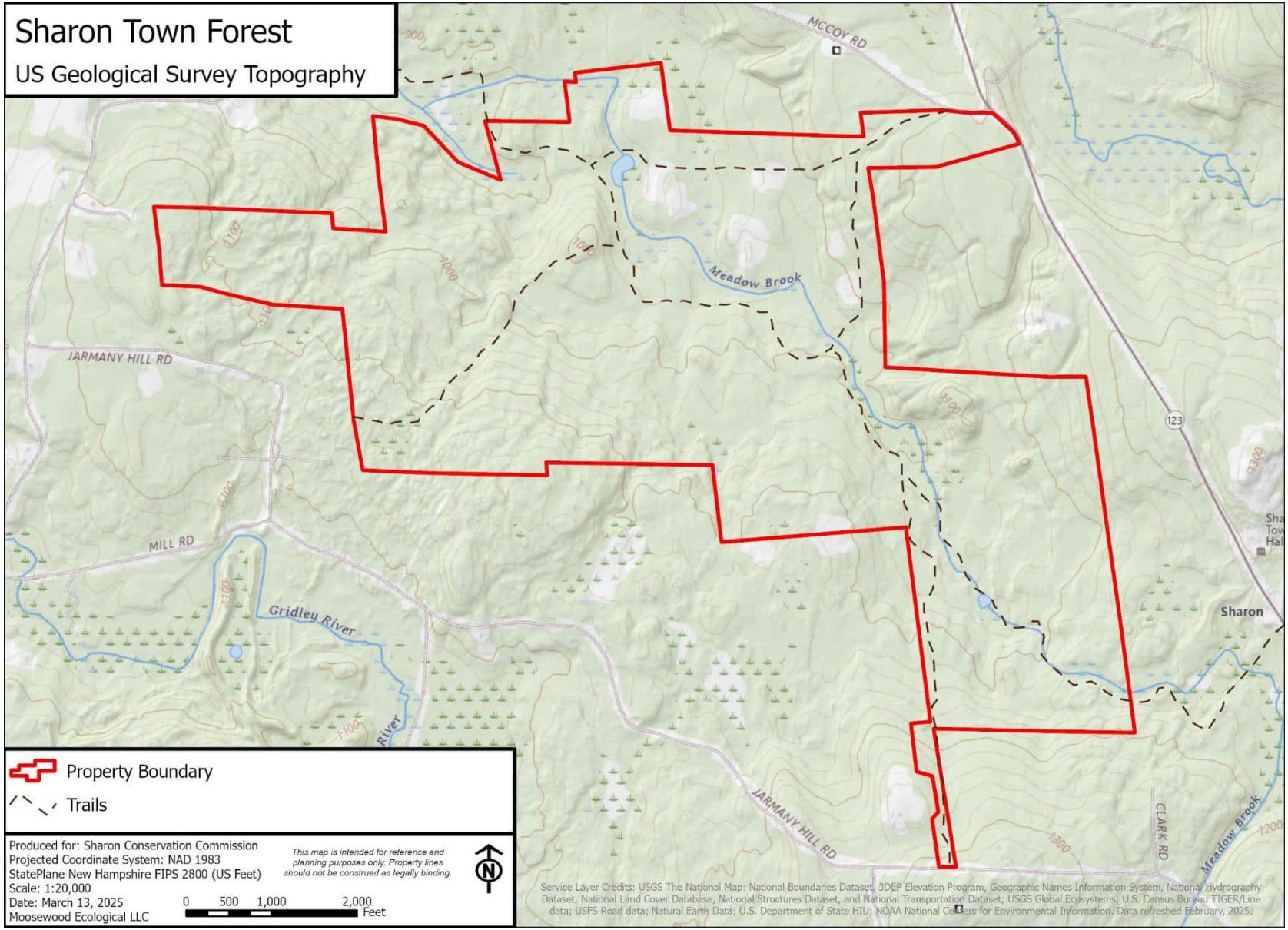

Figure 4. U.S. Geologic Survey topographic map of Sharon Town Forest.

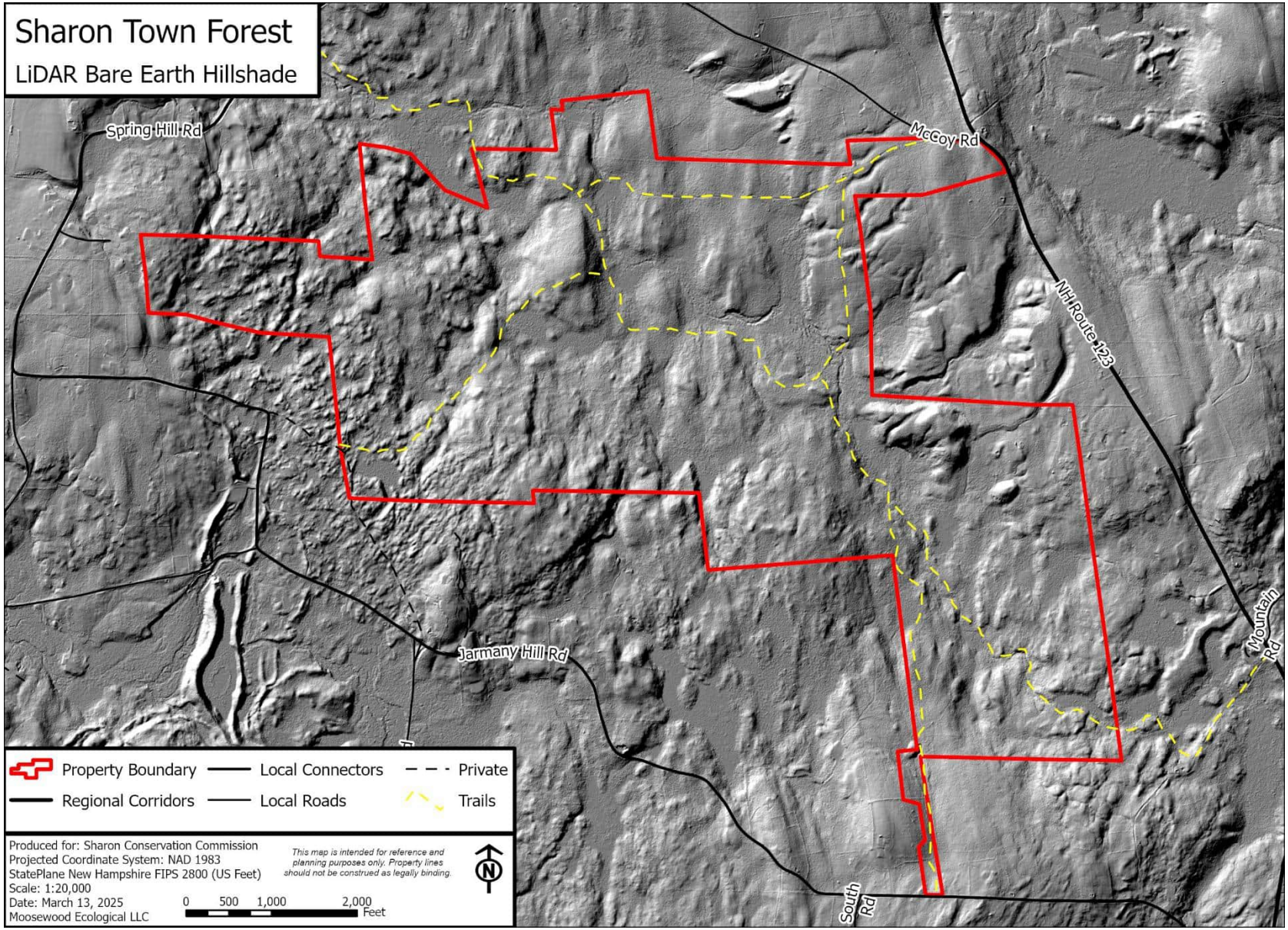

Figure 5. LiDAR-derived elevation model with a hillshading effect to display fine-scale slopes, ledges, and other features.

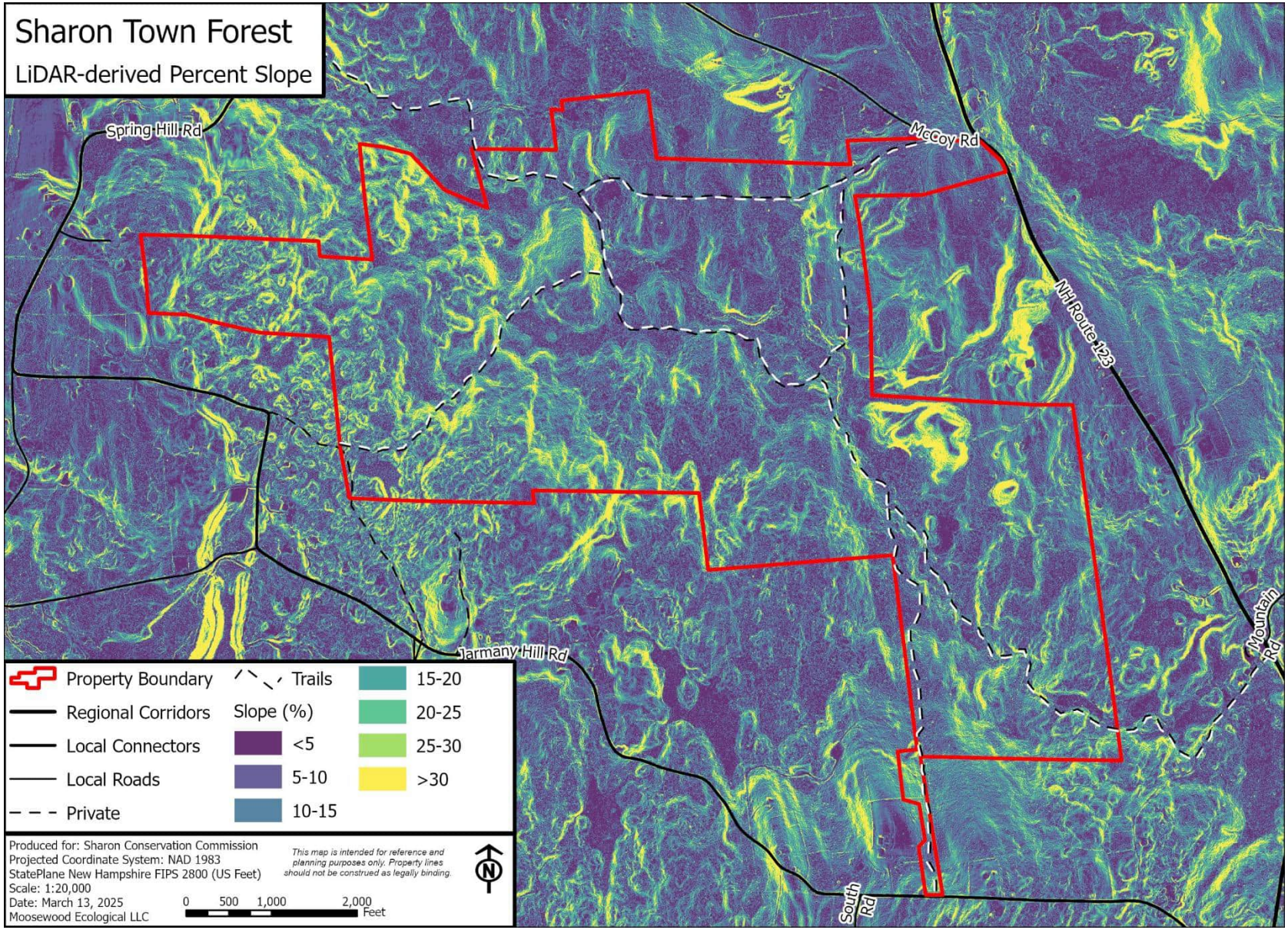

Figure 6. LiDAR-derived slope (%) at Sharon Town Forest, highlighting the properties few level areas and generally bumpy terrain.

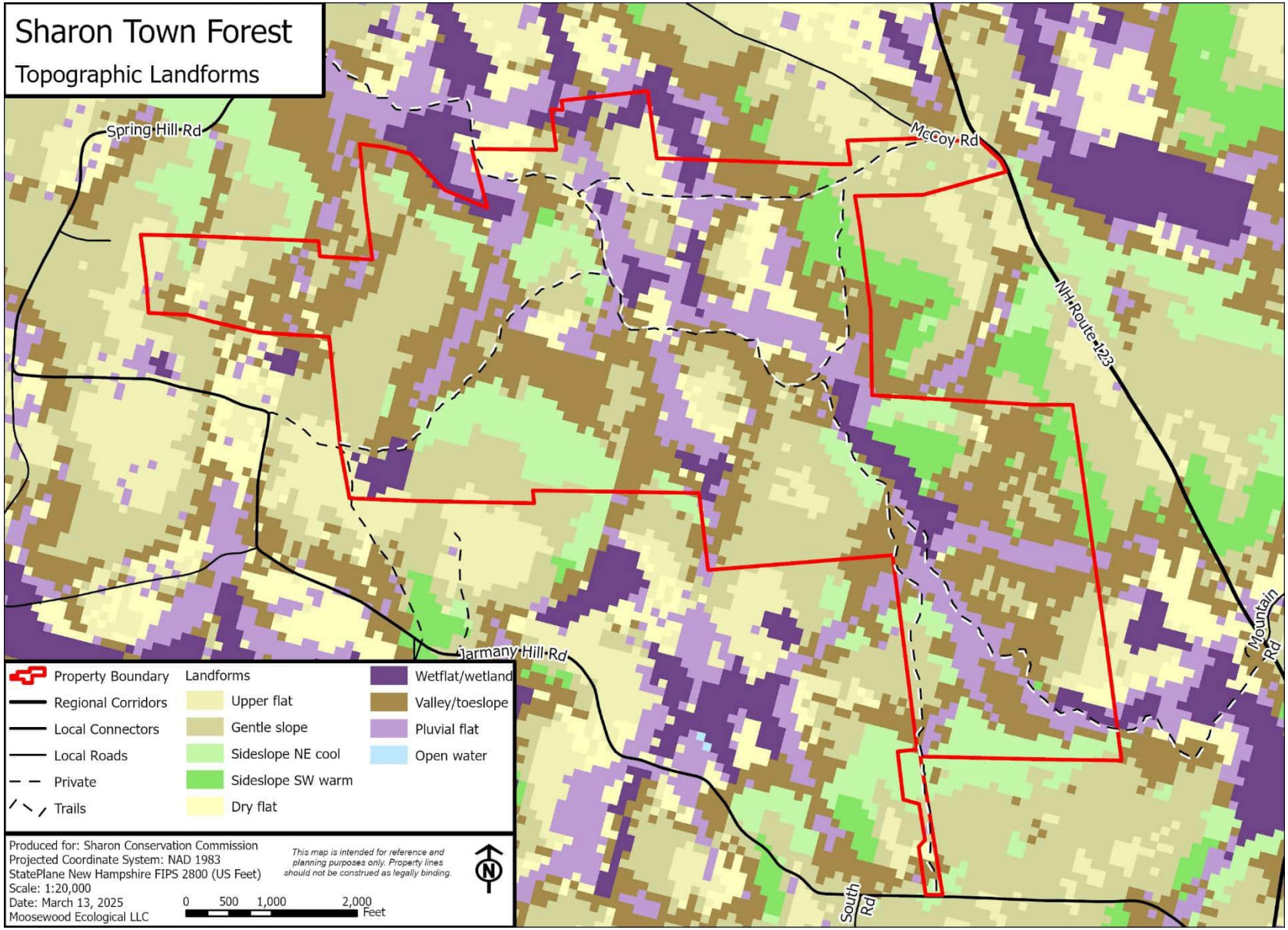

Figure 7. The Nature Conservancy's landform dataset at Sharon Town Forest displays a spectrum of topographic settings.

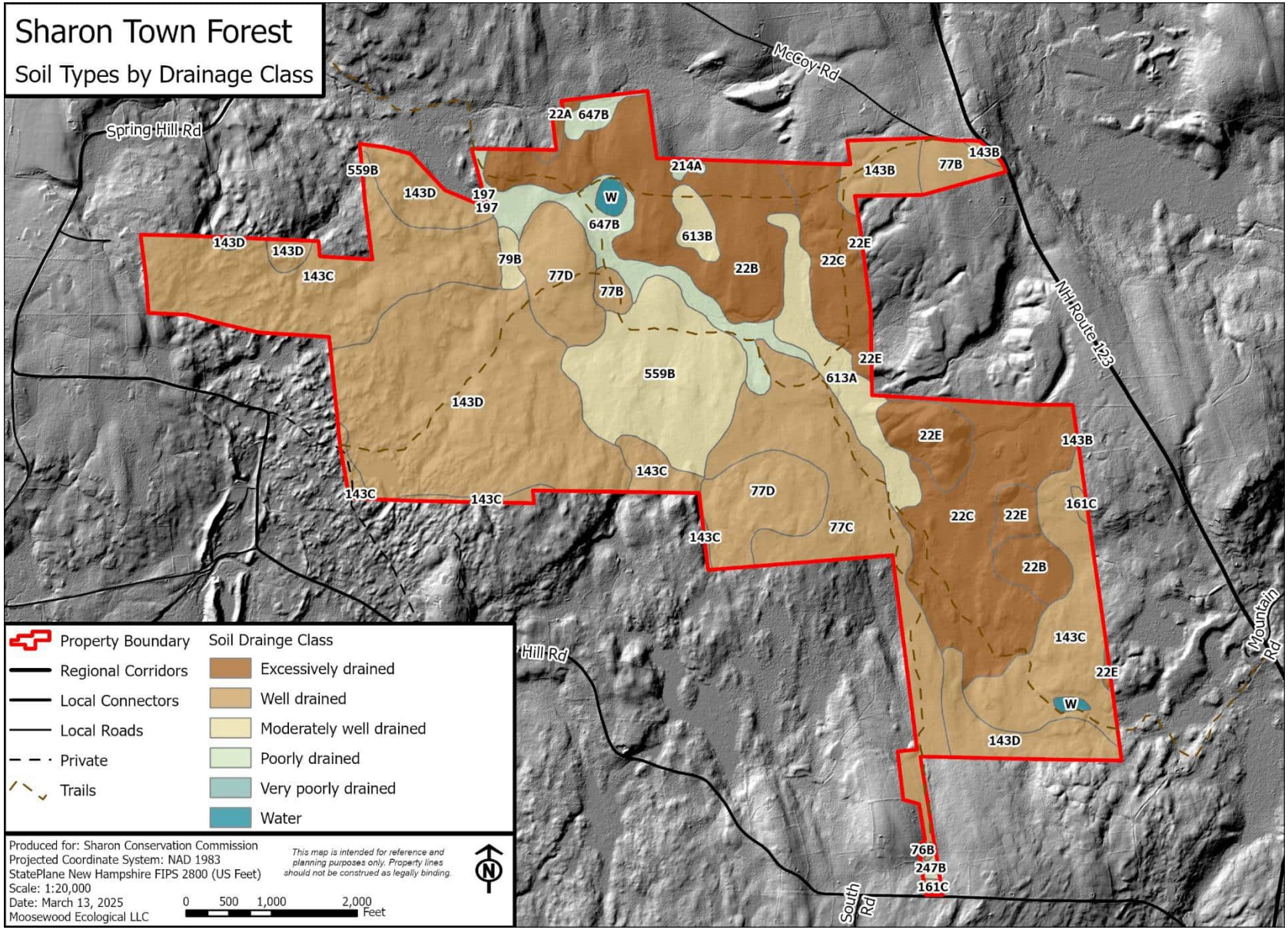

Figure 8. Natural Resources Conservation Service soils data for Sharon Town Forest colored by drainage class.

Table 1. Soil types and characteristics at Sharon Town Forest. Data from Natural Resources Conservation Service.

Soil Key	Soil Type	Drainage Class	Farmland Class	Forest Soil Group	Acres*
197	Borohemists, ponded	Very poorly drained	Not prime farmland	Not classified	<0.5
143B	Monadnock fine sandy loam, 0 to 8 percent slopes, very stony	Well drained	Farmland of local importance	Group IB	16
143C	Monadnock fine sandy loam, 8 to 15 percent slopes, very stony	Well drained	Farmland of local importance	Group IB	158
143D	Monadnock fine sandy loam, 15 to 35 percent slopes, very stony	Well drained	Not prime farmland	Group IB	190
161C	Lyman-Tunbridge-Rock outcrop complex, 3 to 15 percent slopes	Well drained	Not prime farmland	Group IIA	2
214A	Naumburg fine sandy loam, 0 to 3 percent slopes	Poorly drained	Not prime farmland	Group IIB	2
22A	Colton gravelly sandy loam, 0 to 3 percent slopes	Excessively drained	Not prime farmland	Group IC	3
22B	Colton gravelly sandy loam, 3 to 8 percent slopes	Excessively drained	Not prime farmland	Group IC	94
22C	Colton gravelly sandy loam, 8 to 15 percent slopes	Excessively drained	Not prime farmland	Group IC	115
22E	Colton gravelly sandy loam, 15 to 60 percent slopes	Excessively drained	Not prime farmland	Group IIA	26
247B	Lyme fine sandy loam, 0 to 8 percent slopes, very stony	Poorly drained	Not prime farmland	Group IIB	1
559B	Skerry fine sandy loam, 0 to 8 percent slopes, very stony	Moderately well drained	Farmland of local importance	Group IA	70
613A	Croghan loamy fine sand, 0 to 3 percent slopes	Moderately well drained	Farmland of local importance	Group IC	30
613B	Croghan loamy fine sand, 3 to 8 percent slopes	Moderately well drained	Farmland of local importance	Group IC	7
647B	Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony	Poorly drained	Not prime farmland	Group IIB	37
76B	Marlow fine sandy loam, 3 to 8 percent slopes	Well drained	All areas are prime farmland	Group IA	<0.5
77B	Marlow fine sandy loam, 0 to 8 percent slopes, very stony	Well drained	Farmland of local importance	Group IA	14
77C	Marlow fine sandy loam, 8 to 15 percent slopes, very stony	Well drained	Farmland of local importance	Group IA	86
77D	Marlow fine sandy loam, 15 to 35 percent slopes, very stony	Well drained	Not prime farmland	Group IA	60
79B	Peru fine sandy loam, 0 to 8 percent slopes, very stony	Moderately well drained	Farmland of local importance	Group IA	4
W	Water		Not prime farmland	Not classified	4

** Note: acreage calculations in ArcGIS yielded a property size of 920 acres, which differs from the stated property size (891 acres) in Town of Sharon documents.*

PLANT INVENTORY

NATURAL COMMUNITIES AND PLANTS

Natural communities are assemblages of plants, their physical environments (i.e., growing conditions), and ecological processes that affect them. Essentially, natural communities form ecological units that are repeated in the landscape, thereby providing a useful framework when describing vegetated areas. Natural communities include both uplands and wetlands, such as forests, woodlands, shorelines, vernal pools, forested swamps, peatlands, floodplains, and places with scarce vegetation like deep aquatic systems, rocky alpine zones, and sand dunes. Each natural community is distinguished by its species composition, physical structure, and overall condition.

These communities provide scientists and resource managers with an ecological understanding of the land and its inhabitants to make intelligent, informed decisions regarding land use. Therefore, natural community classifications provide conservationists with a powerful tool to guide strategic planning. Equally important, such classifications provide a basis for developing inventory and monitoring programs, as well as a method to document and track rare species and exemplary natural communities. The natural community types described within the study area use Sperduto and Nichols (2011) classification system of New Hampshire's natural communities. A rarity rank, assigned at the state level by the New Hampshire Natural Heritage Bureau (NHNHB), follows each natural community name in the description. A rank of 'S5' indicates a common and secure community, whereas an S1 rank indicates a critically imperiled community at high risk of loss.

Natural communities and other ecological features at the Sharon Town Forest property contribute to the study area's wildlife biodiversity by providing different combinations of plant composition and structure. These include multiple types of uplands and wetlands, open and closed canopies, and both shrubby thickets and tall forests.

All forests at the Sharon Town Forest property fall within the Laurentian mixed forest zone, with the dominant natural system on the property being the hemlock – hardwood – pine forest system. The town of Sharon resides within a "tension zone" between northern and southern forest types, and though most communities fall within this system, there is a notable presence of species with both colder and warmer affinities. Notably, the forest contains small assemblages of species typical in lowland spruce - fir forest/swamp systems, a natural community system that begins to appear at around 1000 feet in elevation but becomes much more common in New Hampshire from the White Mountains north. Red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) are the defining species of this system, while hemlock – hardwood – pine forests are dominated by varying proportions of eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), American beech (*Fagus grandifolia*), and northern red oak (*Quercus rubra*). At least two types of hemlock – hardwood – pine forest were found on the property.

The first type, hemlock – beech – oak – pine forest (S5), dominates much of the property and can be found near the McCoy Road entrance until just after the trail splits, east of Sullivan Loop, and at the southwestern part of the property, shortly after the Big Tree Trail begins at the Meadow Brook Trail. This natural community is floristically diverse but generally consists of

varying proportions of eastern hemlock, eastern white pine, American beech, and northern red oak. Other tree species common to this natural community include red maple (*Acer rubrum*), black birch (*Betula lenta*), and paper birch (*Betula papyrifera*). Accompanying the overstory trees, herbs typical of this community grow along the forest floor, including partridgeberry (*Mitchella repens*), Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), and pink lady's slippers (*Cypripedium acaule*). Along with these species, more northern species, such as red spruce, balsam fir, bluebead lily (*Clintonia borealis*), and velvetleaf blueberry (*Vaccinium myrtilloides*) can be found in low densities within cool or moist microhabitats in this community.

Within the center of the property, along much of the Sullivan Loop and the Meadow Loop Trail until it meets with Big Tree Trail, lies the hemlock forest community (S4). This community is strongly dominated by eastern hemlock in the overstory, which creates shady conditions, making it difficult for many herbaceous species to grow. Sparse herbaceous species can be found in the understory, such as threeleaf goldthread (*Coptis trifolia*), intermediate wood fern (*Dryopteris intermedia*), and partridgeberry, as well as mosses and liverworts like greater whipwort (*Bazzania trilobata*). This area has substantial portions that were impacted by hemlock looper, resulting in nearly complete mortality of hemlocks. These hemlock snags still stand tall but have lost their needles, allowing copious amounts of sunlight to reach the forest floor. The vegetation has quickly responded to these conditions, with a lush understory of ferns such as cinnamon fern (*Osmundastrum cinnamomeum*), intermediate wood fern, and hay-scented fern (*Dennstaedtia punctilobula*), and dense regeneration of red maple, black birch, and yellow birch (*Betula alleghaniensis*) seedlings.

Other than these two dominant natural communities, another unique forest community occurs at the boundary northeast of the intersection of Meadow Brook Trail and Big Tree Trail. The forest here contains indicators of slight enrichment, and may be transitional between the hemlock – beech – oak – pine community and the semi-rich sugar maple forest community (S3S4). Here, hardwoods dominate the canopy such as paper birch, northern red oak, and red maple, with a notable presence of indicators of at least partial enrichment, such as sugar maple (*Acer saccharum*) and white ash (*Fraxinus americana*), as well as understory indicator species like Christmas fern (*Polystichum acrostichoides*) and maple-leaved viburnum (*Viburnum acerifolium*).

While not true natural communities, several openings within the Sharon Town Forest property provide important habitat for wildlife species. A short walk from the entrance on McCoy Road is a small meadow, containing various ferns, grasses, and forbs. The common milkweed (*Asclepias syriaca*) and goldenrods (*Solidago spp.*) here provide nectar for insects, and this area represents unique pollinator habitat on the property. Continuing past where the trail splits in either direction are a complex of patch cuts from a harvest in 2012. These sites are actively regenerating with pole-sized trees such as birches (*Betula spp.*) and white pine. Accompanying them are abundant blueberries (*Vaccinium corymbosum*, *V. angustifolium*, *V. myrtilloides*) that are not only favored nectar sources of bumblebees and other pollinators, but provide vital foraging opportunities for large mammals like black bears.

Wetlands of multiple types cover the remaining topographic surfaces of the study area, and these species-rich settings significantly contribute to biodiversity at the Sharon Town Forest property. These range from forested wetlands to open marshes and peatlands.

The first wetland community is past where the Sullivan Loop splits if entering from the McCoy Road entrance, between the first patch cuts on either leg of the loop trail. This is a forested seep showing characteristics of an acidic *Sphagnum* forest seep community (S3S4), where the water flows south in broad sheet flow until it meets with Meadow Brook. The sphagnum mosses (*Sphagnum spp.*) that cover the forest floor here compress underfoot, revealing the cool, flowing water below. Only plant species that can survive under saturated conditions persist here, such as northern long sedge (*Carex folliculata*), spinulose wood fern (*Dryopteris carthusiana*), crested wood fern (*Dryopteris cristata*), and the showy greater purple-fringed orchid (*Platanthera grandiflora*). Trees find refuge on small hummocks here, and include red maple and eastern hemlock. Where the seep meets with Meadow Brook is a small area with abundant red spruce and balsam fir in the overstory, and species often found in spruce – fir swamps like three-seeded sedge (*Carex trisperma*) and dewdrop (*Rubus dalibarda*).

The remaining forested wetlands are along Meadow Brook and its tributaries, along several stretches that do not constitute their own natural communities but contain unique plants along the banks and within the stream. Along the edges of the flowing stream, cinnamon fern, long beech fern (*Phegopteris connectilis*), wood anemone (*Anemonoides quinquefolia*) are frequent, and where the water slows and becomes shallow, small portions of subacid forest seeps (S3S4) host species like tall meadow-rue (*Thalictrum pubescens*), creeping foamflower (*Tiarella stolonifera*), and American water-pennywort (*Hydrocotyle americana*). There is one notable drainage swamp along the eastern boundary that exhibits slight enrichment due to groundwater seepage, and therefore is unique in otherwise acidic soil conditions (Van de Poll, 1996).

Throughout the rest of Meadow Brook lie many open wetlands which are mostly characterized as sedge meadow marshes (S4). The species composition of this natural community is diverse, with the key components being a lack of trees, infrequent shrubs, and abundant herbaceous species like grasses, sedges, and forbs. Within the sedge meadow marshes at the Sharon Town Forest property, frequent grasses and sedges are sallow sedge (*Carex lurida*), three-way sedge (*Dulichium arundinaceum*), northwest territory sedge (*Carex utriculate*), and rattlesnake mannagrass (*Glyceria canadensis*), which are accompanied by other flowering plants like common boneset (*Eupatorium perfoliatum*), swamp candles (*Lysimachia terrestris*), meadowsweet (*Spiraea alba*), and steeplebush (*Spiraea tomentosa*). Other smaller areas of open wetlands along the eastern portion of Meadow Brook exhibit characteristics associated with nutrient-poor fens.

The remaining wetland communities are small and isolated, but floristically unique. On the property near where the Milt Street Trail meets with the property boundary, two wetlands north and south of the trail show characteristics of the black gum – red maple basin swamp community (S3). This community is uncommon in New Hampshire and reaches the northern extent of its range in the southern part of the state. This community is defined by the abundance of black gum (*Nyssa sylvatica*) in the canopy, accompanied by red maple. Shrubs are frequent in this community and include winterberry holly (*Ilex verticillata*) and highbush blueberry (*Vaccinium corymbosum*),

while sphagnum mosses dominate the saturated forest floor. The uncommon Massachusetts fern (*Coryphopteris simulata*) was found within these wetlands, accompanied by its more southern counterparts.

The final wetland community is a small mineotrophic fen that lies approximately half a mile west of where the Big Tree Trail meets with the Meadow Brook Trail. Here, the canopy retreats and transitions to an open lawn of sphagnum mosses, dwarf shrubs, and herbaceous vegetation. Swamp dewberry (*Rubus hispidus*) creeps along the saturated sphagnum, with abundant, showy flowers like rose pogonia (*Pogonia ophioglossoides*) and bog aster (*Oclemena nemoralis*), graminoids like tawny cotton-grass (*Eriophorum virginicum*), and abundant marsh fern (*Thelypteris palustris*).

KNOWN AND POTENTIAL RARE PLANTS

In addition to exemplary natural communities, NHBHB also maintains a list of rare and uncommon plants. Rare plants include those listed as endangered or threatened by state or federal agencies. Uncommon plants include those listed as state watch species, indeterminate species, or species otherwise monitored by the Natural Heritage Bureau. The state watch classification identifies species vulnerable to becoming threatened, whereas indeterminate species are under review for listing as endangered, threatened, or watch species, but their rarity, nativity, taxonomy, and/or their nomenclature is not clearly understood.

While not listed, surveys detected several American chestnut (*Castanea dentata*) saplings on the property. This species is actively being tracked by NHBHB. Chestnut trees were once abundant on the landscape but rarely reach maturity due to the accidental introduction of chestnut blight (*Cryphonectria parasitica*) in North America during the early 1900s.

Though not species of conservation concern, several plant species uncommon in the region were detected. The aforementioned greater purple-fringed orchid is large and showy, and many individuals were found along seeps and other wetland edges. Its smaller, more discrete relative, small green wood orchid (*Platanthera clavellata*), was found in abundance along the Sullivan Loop between where the trail splits from the McCoy Road entrance until the first patch cut along the northern portion of the loop. Within that patch cut, several narrowleaf gentian (*Gentiana linearis*) plants were observed. Several species infrequent in this latitude were observed, like creeping snowberry (*Gaultheria hispidula*), which is more common in the north, and black gum, which is more common further south. All of these species contribute to and highlight the ecological importance of the Sharon Town Forest property.

INVASIVE PLANTS

Within the framework of this study, we defined invasive plants as any species non-native to New England and whose introduction causes, or is likely to cause, ecological harm. Invasive species aggressively compete with, and displace, native flora and fauna communities (Mehrhoff *et al.* 2003). These introduced species possess many traits that provide them with a competitive edge, including the production of numerous offspring, adaptation to a variety of site and soil conditions, ability to thrive in disturbed areas, early or rapid development in the spring, and prevention of native species from accessing adequate sunlight and nutrients.

Many of the invasive plants found in New England arrived here through various human pursuits, from ornamental landscaping to erosion control. Many non-native species now benefit from natural or semi-natural propagation via human activities and wildlife, the latter of whom transport seeds via ingestion and defecation. Several other invasive species, including plants, macroinvertebrates, and fungi, were brought to North America inadvertently through shipments of various products from other continents. Historically, these invasive organisms have caused the demise of American chestnuts and elms (*Ulmus spp.*). Currently, New Hampshire faces many other pathogens that harm our forests, including Emerald Ash Borer (*Agrilus planipennis*), Beech Bark Scale Disease (*Cryptococcus fagisuga*), and Hemlock Woolly Adelgid (*Adelges tsugae*).

Sixteen species of non-native plant were detected within the Sharon Town Forest property. Some species, like red clover (*Trifolium pratense*) and large hop clover (*Trifolium aureum*), represent little threat to native species while also providing ample feeding opportunities to native pollinators, while others threaten the ecological integrity of the property. Fortunately, all but a single species of aggressive invasive species detected on the property were observed in extremely low abundance, but the presence of many of these species should be considered during future management considerations.

Of aggressive invasive plant species, four species were detected on the property in low abundance. Multiflora rose (*Rosa multiflora*) was detected in the meadow and can form dense thickets. Oriental bittersweet (*Celastrus orbiculatus*) was also detected in the meadow, and this vine can strangle trees, shrubs, and herbaceous vegetation. Japanese barberry (*Berberis thunbergii*) was detected south of the westernmost wetland at the northern border, and is a shade-tolerant shrub that can take over the forest understory. Wall lettuce (*Mycelis muralis*) was detected north of where Big Tree Trail meets Jarmany Hill Road, and is a small annual plant that can form dense colonies, shading out other herbaceous vegetation. While not impacting the ecological integrity of the property currently, disturbance events like logging and trail clearing can lead to these species' spread.

One species that has had detrimental impacts on the Sharon Town Forest is glossy buckthorn (*Frangula alnus*). This species was found in variable densities throughout most forest openings on the property, including the meadow, patch cuts, forest openings created by hemlock looper damage, along Meadow Brook and its tributaries, and especially along the edges of wetlands. This species is a small tree/shrub of openings and wetland edges that can grow in thick monocultures and leaf out early, shading out and outcompeting native vegetation. The presence of this species in abundance also poses threat during future disturbance events, as birds and other wildlife spread seeds and this species rapidly colonizes openings.

WILDLIFE INVENTORY

ECOLOGICALLY SIGNIFICANT WILDLIFE HABITATS

The New Hampshire State Wildlife Action Plan (SWAP) was first developed in 2005 by the New Hampshire Fish and Game Department in collaboration with various agencies, organizations, and individuals. The most recent revision was completed in 2015, with statewide habitat data updates occurring every five years, and a new update expected this year, 2025. The SWAP is a key planning and educational tool for conserving New Hampshire's biodiversity, widely used by federal, state, and municipal agencies, conservation commissions, land trusts, natural resource professionals, and private landowners. It supports informed land use and management decisions to maintain diverse wildlife habitats, ensuring common species remain abundant while preventing the decline of rare and endangered species.

As part of the SWAP, 28 general habitat types were identified through an iterative process combining complex modeling, existing datasets, and known plant communities, geology, soils, and hydrology. Of these, seven habitat types were mapped within Sharon Town Forest (Table 1). The combination of various uplands and wetland types provide distinct habitats for diverse wildlife at Sharon Town Forest. This diversity was highlighted through productive wildlife surveys for birds, mammals, amphibians, reptiles, and invertebrates. Appendices A and B list all species reported from the property, and future exploration will certainly document additional wildlife.

Table 2. Significant wildlife habitats at Sharon Town Forest as mapped by the State Wildlife Action Plan (2020).

Habitat Type	Acres*	Percent of Property
Grassland	0.2	<0.1%
Hemlock-hardwood-pine forest	881.3	95.8%
Northern forested swamp	1.7	0.2%
Open water	0.5	0.1%
Peatland	0.7	0.1%
Temperate forested swamp	0.3	<0.1%
Wet meadow/shrub wetland	33.8	3.7%

** Note: acreage calculations in ArcGIS yielded a property size of 918.5 acres, which differs from the stated property size (891 acres) in Town of Sharon documents.*

While generally accurate, field surveys revealed several forested wetlands missing from the SWAP's dataset. This included a modest 6-acre northern forested swamp located southwest of the junction of Milt Street Trail and Sullivan Loop Trail (see Figure 17). As such, the stated acreages in Table 2 provide an approximate breakdown of habitat types across the property.

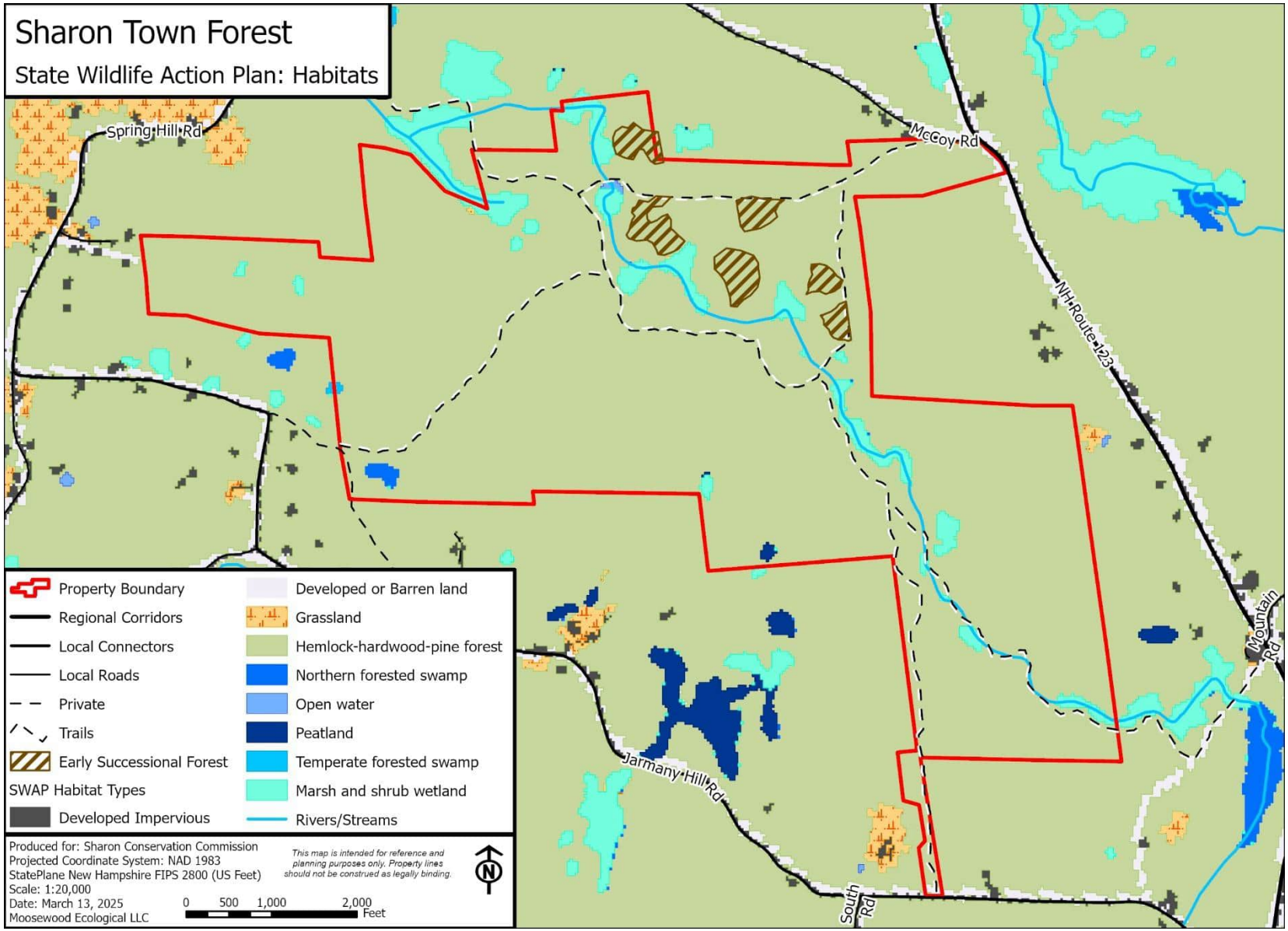

Figure 9. State Wildlife Action Plan habitat types mapped at Sharon Town Forest with young-forest patch cuts added.

Grasslands

Grasslands are non-forested areas dominated by grasses, sedges, wildflowers, and other herbaceous plants, with few or no trees. This habitat type supports agriculture, wildlife, and biodiversity. Once more abundant in New Hampshire, grasslands declined after the late 1700s to mid-1800s as abandoned farmland reverted to forest. This shift significantly reduced habitat for grassland-dependent wildlife, particularly species requiring large, contiguous open areas for breeding, such as Bobolink, Upland Sandpiper, and Grasshopper Sparrow. However, many species, including foraging ungulates, nesting turtles, and pollinating insects, still benefit from small or isolated grassland patches.

The log landing near the McCory Road contains Sharon Town Forest's only mini-grassland habitat.

Despite their ecological importance, only 8% of New Hampshire's grasslands are protected under conservation easements (SWAP 2015). At Sharon Town Forest, the SWAP habitat model precited an estimated 0.2 acres of grassland habitat occurring near one of Meadow Brook's wetlands. However, the SWAP modeling process often struggles with grassland identification, and the small SWAP-mapped grassland area at Sharon Town Forest better represents the emergent wetland which is dominated by grasses, sedges, and other herbaceous plants similar in structure to grasslands. The 0.65-acre log landing near the McCoy Road entrance represents the only site that approaches grassland habitat at Sharon Town Forest. Many pollinators, spiders, other invertebrates, and several snakes were observed at this site, as well as numerous plants that grow well in full sunlight.

Hemlock-Hardwood-Pine Forest

The hemlock–hardwood–pine forest is New Hampshire's most abundant habitat type, covering nearly half of the state's upland area. Dominated by eastern hemlock, eastern white pine, American beech, and red oak, this forest occurs across diverse soils and topography, leading to variations in species composition. In the low-elevation valleys of the south-eastern region, it transitions into Appalachian oak – pine forest, while at higher elevations, it shifts to northern hardwood – conifer forest. This habitat plays a vital ecological role, buffering rarer habitat types and supporting 140 vertebrate species, including 15 amphibians, 73 birds, 39 mammals, and 13 reptiles.

Early-successional hemlock-hardwood-pine forest within a patch cut.

At Sharon Town Forest, the SWAP identified 881.3 acres of hemlock – hardwood – pine forest, making it the dominant habitat type at almost 96% of the property. This habitat type also contains about 23 acres of young forest, or early-successional, habitat created through six patch cuts in 2012. As New England's warming climate progresses, we expect that the SWAP's prediction of Appalachian oak – pine distribution at Sharon Town Forest will become more accurate, especially as the property experiences rising temperatures, reduced snowpack, and multiple diseases and pests that stress American beech, eastern hemlock, and white ash, which are a strong presence across much of the property. Despite these changes, the forest's current ecological value remains high, providing essential food, shelter, and habitat connectivity for wildlife.

Marsh and Shrub Wetlands

Marsh and shrub wetlands, also referred to as 'wet meadow/shrub wetlands' by the SWAP, include three wetland types: emergent marshes (featuring aquatic plants like cattails and water lilies), wet meadows (dominated by grasses and sedges), and scrub-shrub wetlands (supporting shrubs and young trees). These habitats often develop after beavers abandon ponds or in areas with stable groundwater levels. Wetlands provide critical ecological functions, such as filtering pollutants, controlling floods, cycling nutrients, and moderating climate change impacts. Wetlands with multiple subtypes are particularly rich in biodiversity.

An old beaver pond, now a wet meadow, supports many herbaceous wetland plants.

Marsh and shrub wetlands cover about 3% (154,000 acres) of New Hampshire's landscape, with 27% of this area protected by conservation easements. These wetlands support over 100 vertebrate species, including 18 of conservation concern, which rely on wetlands for foraging, nesting, breeding, and shelter. At Sharon Town Forest, approximately 33.8 acres of marsh and shrub wetlands are present, making up about 3.7% of property. Good examples of this habitat type can be viewed from the Sullivan Loop Trail at its northern crossing of Meadow Brook. The Meadow Brook Trail also passes several wet meadows and shrub wetlands. While these wetlands comprise just a small percentage of the overall property, they contain a very high proportion of the Sharon Town Forest's biodiversity.

Open Water

In New Hampshire, lakes and larger ponds provide recreational opportunities and support diverse aquatic wildlife and plants. Species like amphibians, aquatic reptiles, waterfowl, and raptors such as Bald Eagles and Ospreys depend on open water during various life stages. This habitat also sustains a range of aquatic organisms, including plants, macroinvertebrates, zooplankton, and bacteria, forming the foundation of the food web. Open water habitats are classified into cold-water and warm-water lakes and ponds, each supporting specific fish and plant communities depending on nutrient levels and water depth.

Unmaintained beaver dams still retain some small ponds along Meadow Brook.

Open water areas are generally lacking at Sharon Town Forest, especially since American Beavers did not appear to be actively maintaining any dams during the 2024 field season. However, about 0.5 acres of open water remain in two downstream portions of older beaver ponds. This acreage likely fluctuates due to beaver activity and rainfall within the Meadow Brook watershed. The SWAP does not specifically classify the areas of open water on the Sharon Town Forest property as either cold or warm water, likely due to data gaps or modeling uncertainty. Visual and biological assessments reveal that the relatively shallow depth of these inactive beaver ponds probably limits its suitability for cold-water species like Eastern Brook Trout, which may find shelter in any of Meadow Brooks's cooler, canopy-covered, and invertebrate-rich sections. New Hampshire Fish and Game periodically conducts fish surveys in a section of Meadow Brook near Spring Hill Road, and Eastern Brook Trout have been detected by every survey, the most recent one taking place in 2019. Eastern Brook Trout, particularly smaller individuals, likely swim upstream through Sharon Town Forest, which provides critical protections and supporting habitat for this species of conservation concern.

Peatland

Peatlands are open wetland habitats dominated by shrubs, sedges, and sphagnum mosses, which over time decompose and develop carbon-dense peat soils. Peatlands form in sites with limited to no surface water input and their pH ranges from highly acidic and nutrient-poor to circumneutral and nutrient-enriched. "Quaking" bogs, where a thin mat of sphagnum moss floats on the water surface, are an uncommon yet familiar type of peatland to some. Within the Monadnock Region, peatlands can occur in isolated basins, or occupy the shallow end of larger wetlands or

shallow ponds. Most peatlands in the region present acidic (low pH) growing conditions, which strongly influences their plant composition.

A small peatland near Meadow Brook with spoonleaf sundew, a carnivorous plant, and water-loving sphagnum mosses.

Typical plants associated with poor to medium nutrient peatlands include insectivorous pitcher plants and sundews, diverse sedge communities, mosses, highbush blueberry, mountain holly, speckled alder, sheep laurel, bog rosemary, and forbs such as bog aster and bog goldenrod. Fifty-four rare plants are supported by peatlands state-wide, including dwarf huckleberry, several rare sedges, and rare orchids. Associated uncommon wildlife species of note include the Ringed Bog Haunter dragonfly, Palm Warbler, and Eastern Ribbon Snake. At Sharon Town Forest, the SWAP mapped about 0.7 acres of small peatlands along the property's southern boundary. While these peatlands are too small to sustain many of the rare plants and wildlife associated with peatlands elsewhere within the New Hampshire, they help contribute to the Town Forest's overall biodiversity.

Temperate and Northern Forested Swamps

Eastern hemlock, red ample, and cinnamon fern grow readily in several forested swamps at Sharon Town Forest.

Northern swamps, primarily found from the White Mountains northward and at higher elevations in southwestern New Hampshire, are forested wetlands typically dominated by black or red spruce. These swamps frequently surround bogs or fens and may represent the final stage of succession from open peatlands to forested peaty wetlands. Black spruce peat swamps, common in central and northern New Hampshire, typically form in stagnant basins with poor drainage, especially where seeps emerge at the groundwater-surface interfaces. These sites may contain prime habitat for many amphibians, including Four-toed Salamanders. Threats to these swamps include habitat loss due to development—approximately 950 acres of wetlands were lost in New Hampshire between 2004 and 2015—as well as fragmentation from roads and climate-driven shifts in species composition. Northern swamps cover about 36,000 acres, or roughly 1% of New Hampshire's land area, and only 34% of this habitat was protected as of 2015.

Both northern and temperate swamps are similar in that both wetlands are characterized by a forest structure. However, the more southern temperate swamps typically present high concentrations of red maple and eastern hemlock. Temperate forested swamps often support an understory of ferns, northern highbush blueberry, and winterberry, along with common wetland

species including cinnamon fern and sphagnum mosses. When water levels are sufficiently deep, often in hollows formed by fallen trees, these swamps can provide critical breeding habitat for vernal pool species. Temperate swamps cover approximately 92,000 acres in southern and central New Hampshire and form in low-lying basins where groundwater maintains saturated, organic soils. About 22% of temperate forested swamps are protected on lands with conservation easements.

At Sharon Town Forest, the SWAP identified 0.3 acres of temperate forested swamp located along the southwestern property boundary and 1.7 acres of northern forested swamp located primarily in a single large patch also in the southwestern section. Both sites contain vernal pools. Other forest swamp locations, minimally captured by the SWAP habitat model, occur at the wetland-upland transition zone of several of Sharon Town Forest's marsh and shrub wetlands associated with Meadow Brook. Additionally, multiple small and seasonally saturated or seepy forested areas resembling temperate swamps were observed at Sharon Town Forest during this study and these locations were not captured by SWAP modeling but still provide significant habitat value.

Vernal Pools

Vernal pools are unique wetlands critical for certain amphibians, including Wood Frogs and Spotted Salamanders, as well as reptile species of conservation concern like Blanding's Turtle, Spotted Turtle, and Eastern Ribbon Snake. These pools also support unique aquatic macroinvertebrates such as fairy shrimp and fingernail clams. Unlike other wetlands, vernal pools fill with water in the spring, dry out later in the summer, and lack viable fish populations. This unique cycle, along with the absence of permanent inlet or outlet streams, is essential for the survival of vernal pool obligate species.

This vernal pool at Sharon Town Forest contained an estimated 42,000-126,000 wood frog eggs and 200-400 spotted salamander eggs.

For vernal pools to remain as functional habitats for the species that depend on them, these small waterbodies require a forested canopy and significant intact forest surrounding them. Many obligate species spend most of their life cycle up to 1,000 feet from the pool in these upland forests. Vernal pool species also opportunistically utilize forested and shrub wetlands with year-round water for egg laying. Due to their small size and sometimes unpredictable nature, vernal pools have not been mapped at the statewide scale. As a result, this habitat type is best documented through on-the-ground surveys.

BIRD SURVEYS

Standardized surveys for breeding birds took place on June 4, 5, 11, 20, 21 and July 2 when most local breeding species were expected to have returned from spring migration and before birdsong waned later in the summer. Sampling occurred within earshot of all habitat types present at Sharon Town Forest, and 26 point-count stations were spaced at least 250 meters apart to reduce double-counting of individual birds. To maximize detection of breeding songbirds, surveys occurred on calm mornings with no precipitation and ended no later than three hours after sunrise. Each bird survey sampled approximately one third of the point-count stations, for a total of two surveys per station during the breeding season. All birds confidently identified by sight or sound were recorded during a 10-minute observation window and assigned a behavior breeding code. In addition to these standardized surveys, all birds detected during non-avian surveys or other site visits were incidentally noted.

Over the course of the 2024 field season, we documented 75 bird species at Sharon Town Forest. Breeding bird surveys detected 55 species, whereas incidental observations across spring, summer, and autumn contributed the remaining 20 species. This combined list includes 23 species of conservation concern whose populations are declining within New Hampshire, the Northeast, or range-wide. American Goshawk, Barn Swallow, Common Grackle, and Rose-breasted Grosbeak were only noted as flyovers during the breeding bird surveys, yet may breed on the property in some years given its habitat suitability for these species. All other species exhibited evidence of at least possible breeding behavior at Sharon Town Forest.

Two species, the Canada Warbler and Chimney Swift were flagged as a species of conservation concern in each of the five reports and assessments checked. Canada Warblers depend on mixed coniferous-deciduous forests with a shrubby and mossy understory, often located near water. Range-wide, this species has declined by 62% since 1966 due to loss of forested wetlands and loss of shrubby understories due to White-tailed Deer browse and some forestry practices that remove this understory component. At Sharon Town Forest, multiple individuals were heard singing from forested wetlands near Meadow Brook and its tributary that flows near the Milt Street Trail. Chimney Swifts, by comparison, nest primarily in chimneys but sometimes in hollow trees and caves in rural areas. These aerial insectivores have declined by 67% since 1966, mostly due to loss of suitable nest sites and diminishing populations of flying insects.

Table 3. Bird species of conservation concern detected at Sharon Town Forest. Probable and confirmed breeders marked with an *.

Common Name	Conservation Status	Common Name	Conservation Status
American Goshawk	1, 4, 5	Northern Flicker	1
Barn Swallow	1	Ovenbird*	1
Blackburnian Warbler*	1	Prairie Warbler*	2, 3, 4, 5
Black-throated Blue Warbler*	1	Purple Finch*	1, 4, 5
Black-throated Green Warbler*	1	Rose-breasted Grosbeak	1
Brown Creeper*	1	Ruffed Grouse*	1, 4, 5
Canada Warbler*	1, 2, 3, 4, 5	Scarlet Tanager*	4, 5

Common Name	Conservation Status	Common Name	Conservation Status
Chestnut-sided Warbler*	1	Veery*	1, 4, 5
Chimney Swift	1, 2, 3, 4, 5	Wood Duck	1
Common Grackle	2	Yellow-bellied Sapsucker*	1
Eastern Towhee*	4, 5	Yellow-billed Cuckoo	2
Eastern Wood-Pewee*	1		

Key to conservation status identifiers:

1 – Bird Conservation Region 14 assessment (Dettmers, 2006)
2 – Partners in Flight assessment (Rosenberg et al., 2016)
3 – North American Bird Conservation Initiative assessment (NABCI, 2022)
4 – New Hampshire State Wildlife Action Plan (NHFG, 2015)
5 – New Hampshire Audubon assessment (Hunt, 2020)

Widely distributed species that occurred at a high percentage of point-count stations across Sharon Town Forest included many common forest songbirds of the Monadnock Region. The property's most widespread species are well-adapted to mixed conifer-hardwood forests and four species were detected from all 26 point-count stations: Black-capped Chickadee, Blue Jay, Ovenbird, and Red-eyed Vireo (Figure 10). Conversely, less-widely distributed species represented more secretive birds, such as Ruby-throated Hummingbirds and Barred Owls, and species that associate with specific or limited habitat types, such as Canada Warblers (inhabit forests or forested wetlands with a dense conifer understory), Chipping Sparrows (inhabit dry pine forests and residential areas), and Swamp Sparrows (inhabits emergent wetlands with moderate to low shrub cover).

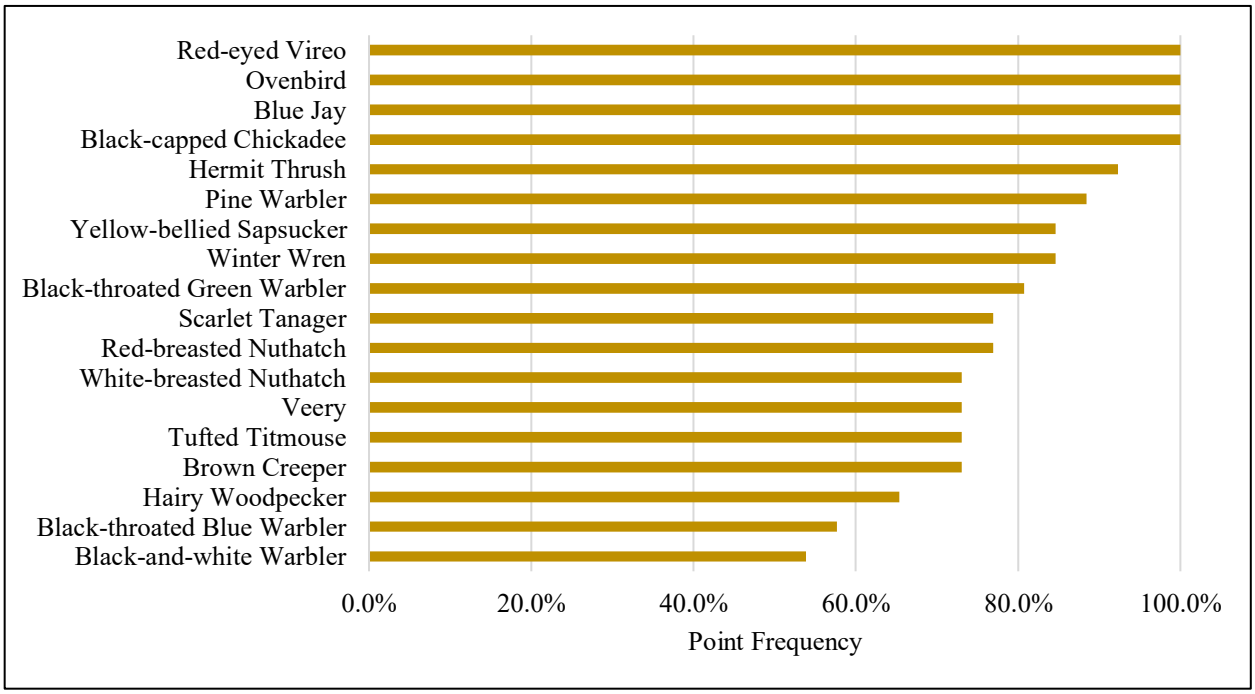

Figure 10. Point frequency of breeding-season bird species detected at more than 50% of point-count stations within Sharon Town Forest.

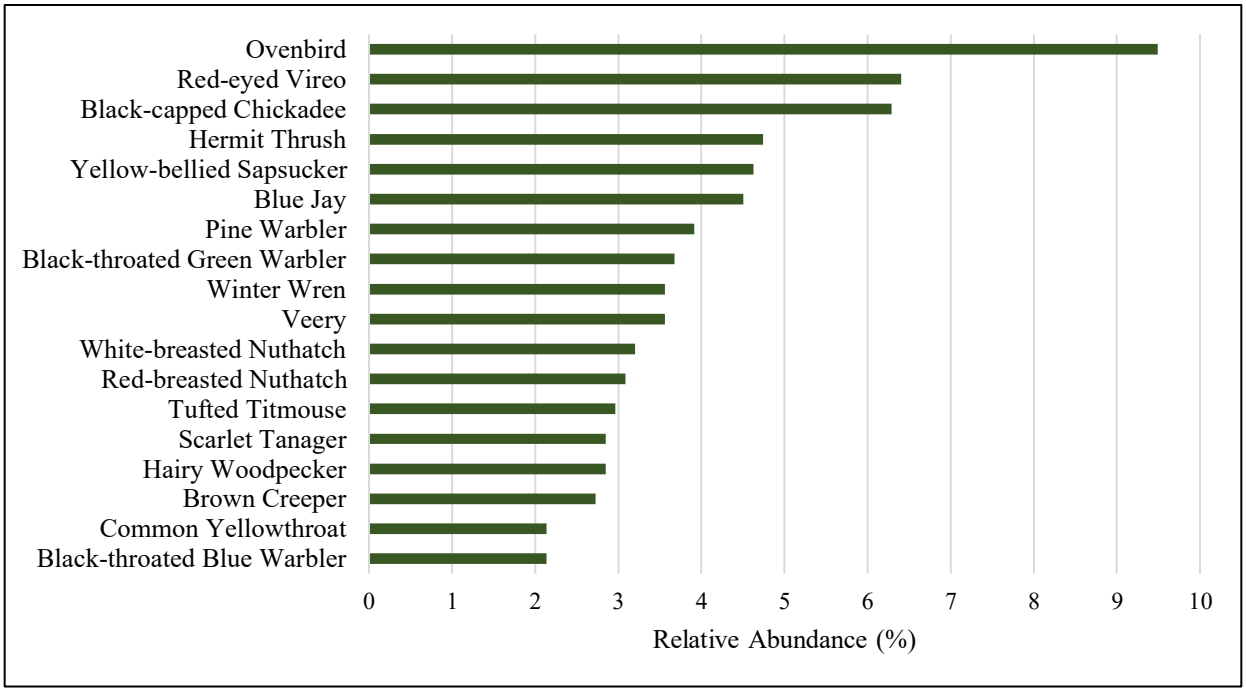

Figure 11. Relative abundance of breeding-season bird species detected at Sharon Town Forest.

Complimentary to evaluating each species' distribution throughout Sharon Town Forest, relative abundance offers a different perspective by calculating the percentage of all total detected birds represented by each species. In other words, birds with a higher relative abundance make up more of the overall bird population than those with a lower relative abundance. At Sharon Town Forest, loud-singing and ground-nesting Ovenbird was the property's most abundant species and was documented throughout the forest's uplands (Figure 11). Multiple Ovenbird nests with eggs were encountered over the course of the breeding season. Other habitat generalists within the Monadnock Region constituted the next five most-abundant species with a relative abundance of more than 4%: Red-eyed Vireo, Black-capped chickadee, Hermit Thrush, Yellow-bellied Sapsucker, and Blue Jay.

The high degree of overlap between abundant species and widely-distributed species underscores the widespread availability of second-growth hardwood and mixed hardwood-conifer forests typical of the Monadnock Region. Multiple species of conservation concern demonstrated healthy populations at Sharon Town Forest. Furthermore, the presence of multiple Scarlet Tanager pairs, a species of greatest conservation need in New Hampshire, reflected the property's large unfragmented setting; Scarlet Tanagers require large tracts of interior forest for successful breeding. Some of Sharon Town Forest's least abundant breeding season species included Alder Flycatchers, Gray Catbirds, Canada Geese, and Eastern Phoebes.


Broad-winged Hawks and Ovenbirds (eggs pictured) nest at Sharon Town Forest.

MAMMAL SURVEYS

Due to the inventory timeline for spring through autumn, the primary mammal survey methodology consisted of wildlife camera traps rather than snow tracking. Designed to capture large and medium-sized mammals as they move throughout Sharon Town Forest, biologists deployed five cameras from early May to late September, 2024. During this time, all cameras were periodically moved to cover as much of the property as possible. Each camera was positioned one to two feet above ground and secured to trees facing the intended capture area, typically a wetland edge, wildlife trail, recreation trail, or stone wall opening where wildlife activity was expected or detected prior to deployment. All cameras were active 24 hours a day and set to record with four successional pictures or a 30-second video when triggered by motion in their field of view. A secondary mammal survey type consisted of visual encounters of mammals and their signs (e.g., scat, tracks, chew marks, hair) observed during in-person site visits.

Overall camera trapping efforts yielded 712 captures of 27 total species (17 mammals, 9 birds, and 1 spider). White-tailed Deer, Eastern Chipmunk, American Red Squirrel, and Eastern Gray Squirrel were recorded on 251, 125, 99, and 54 instances respectively. Long-tailed Weasel, North American Porcupine, American Black Bear, Bobcat, Common Raccoon, and Coyote rounded out the top ten most-observed species with 13 or more observations each. Visual encounters and observed mammal signs did not result in any different species than the cameras captured.

Sharon Town Forest provided many quality observations of New Hampshire's larger mammals. One observation included a mother and calf moose, and moose tracks and scat were abundant in some areas. Also captured on our cameras were no fewer than four distinct adult black bears, one of which was a female with two young cubs. Healthy bobcat and coyote were also observed throughout the property. These observations indicate that Sharon Town Forest

A mother black bear and two cubs photographed at Sharon Town Forest in late July.

Bobcats (left) and coyotes (right) frequently utilized Sharon Town Forest's natural and human-created pathways such as stone walls and trails.

provides important habitat and food source to many species and individuals. Given the expected ranges of the species documented, it can also be assumed the property is well connected to the surrounding area that also provides important resources for the area's wildlife. This assumption is supported by the SWAP labeling much of Sharon Town Forest as highly ranked or supporting habitat. The property also has numerous wildlife corridors leading to and from it, linking Sharon Town Forest as part of an integral network connecting vital habitats in the region.

Our survey efforts did not extend to include bats and small mammals, and occasional observations of deer mice (*Peromyscus* sp.) represented most of the small mammal sign opportunistically observed during the study. While undocumented during the survey period, other small rodents such as voles, shrews, flying squirrels, and additional mice species likely inhabit Sharon Town Forest. This is supported by the numerous predator species present that typically prey on small rodents. Bats are another mammal group expected on the property. New Hampshire is home to eight species of bats, one of which are state endangered and one is federally threatened.

REPTILE AND AMPHIBIAN SURVEYS

New Hampshire is home to 40 native species of reptiles and amphibians, many of which have restricted geographic ranges within the state. Several at-risk and range-restricted species are known to occur within Sharon, while more widespread species can be found across all elevations, including portions of the White Mountains' alpine zone. To survey for reptile species inhabiting Sharon Town Forest, we employed a series of repeated, direct searches within all habitat types throughout the spring and summer. Surveys included, but were not limited to, counts of basking turtles using a spotting scope or binoculars, temporarily lifting cover objects, walking transects, and stationary observation. All reptile-focused surveys took place on warm, sunny days to improve detectability. Amphibian surveys largely depended on visual encounters sweeps, which took place on warm, humid days, often following rain events to maximize observations of amphibians moving overland and in aquatic habitats. Targeted surveys of potential vernal pools for amphibian egg masses occurred in spring before these isolated pools dried.

Sharon Town Forest exhibits excellent habitat connectivity for amphibians within the property bounds, particularly among its numerous vernal pools and wetland complexes, including emergent marshes, shrub wetlands, and small peatlands, northern forested swamps, and temperate forested swamp. Other important habitat features for reptiles and amphibians found at Sharon Town Forest included abundant leaflitter, thick loamy soils, downed coarse woody material, sun-lit wetland edges, and exposed rocks and logs, each of which provide essential basking, foraging, and sheltering resources.

Smooth Green Snakes, a species of greatest conservation need, depend on the property's habitat mosaic.

Combined, we observed two species of reptiles and seven species of amphibians utilizing the upland or wetland habitats found at Sharon Town Forest. No turtles were observed during the course of this study, but when beaver ponds along Meadow Brook contain more water, they likely attract both Painted Turtles and Common Snapping Turtles. Our surveys observed numerous garter snakes, including a mating pair, and two Smooth Green Snakes, a species of greatest conservation need in New Hampshire.

Most amphibian species detected at Sharon Town Forest are common native inhabitants of New Hampshire: American Bullfrog, Eastern Newt, Eastern Red-backed Salamander, Green Frog, and Spring Peeper. Egg masses of two ecologically-sensitive amphibians, Wood Frogs and Spotted Salamanders, were documented in 22 of Sharon Town Forest's vernal pools. Five additional potential vernal pools exhibited favorable water depths, vegetation, and other characteristics that could support obligate vernal pool species in other years. The combined total of 27 confirmed and potential vernal pools underscores Sharon Town Forest's ecological significance. These often-overlooked, isolated bodies of water provide critical reproductive sites for not only Wood Frogs and Spotted Salamanders, but also fingernail clams and fairy shrimp, the latter of which were also observed in several of Sharon Town Forest's pools.

Left to right: Wood Frog, Green Frog, and Red-spotted Newt represent three of the more abundant amphibian species at Sharon Town Forest.

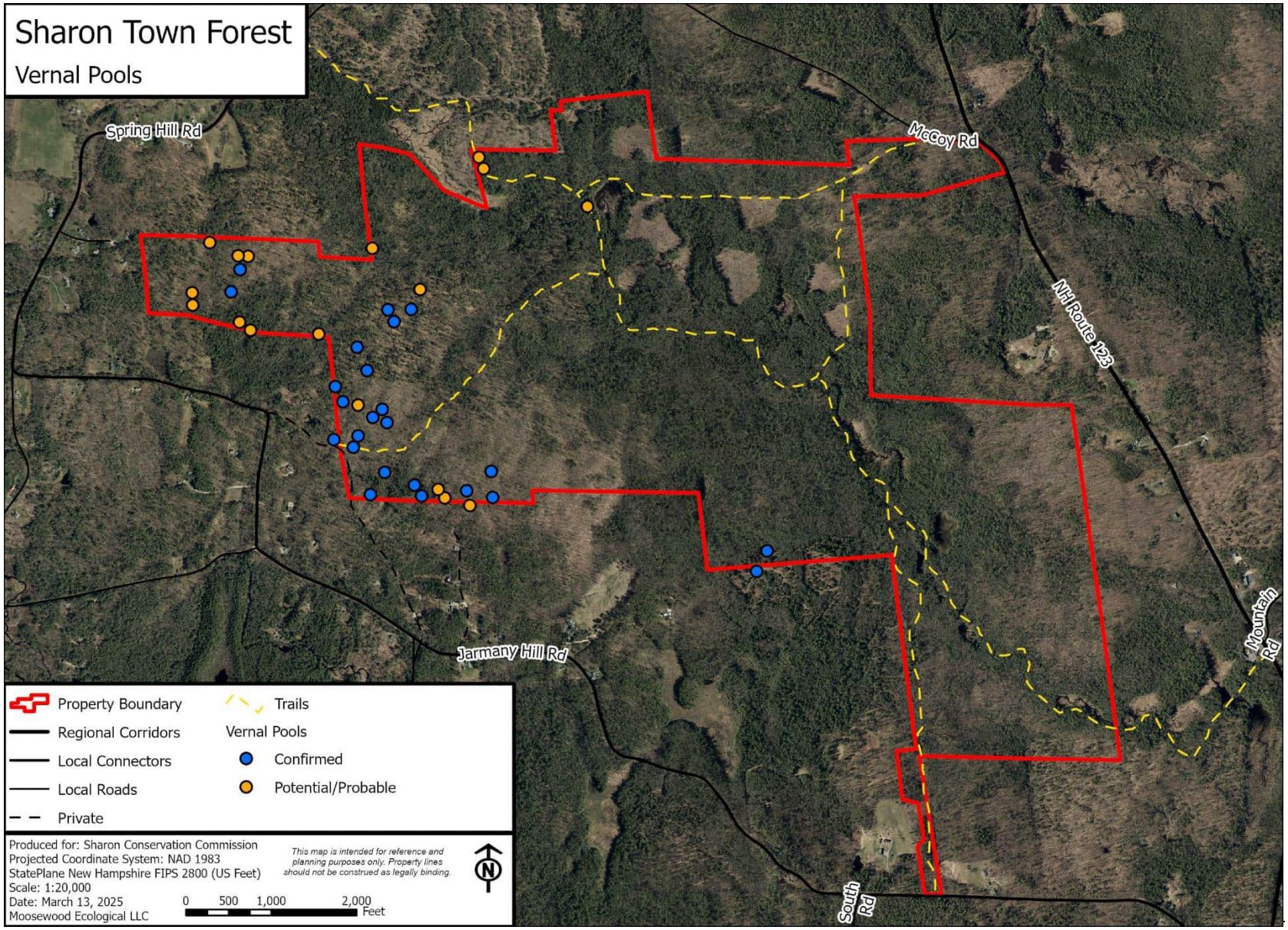

Figure 12. Confirmed and potential vernal pools at Sharon Town Forest.

INVERTEBRATES

While no standardized or targeted surveys were conducted for invertebrates at Sharon Town Forest, it was hard not to document these often photogenic or poorly-studied creatures. Our observations of 356 species of invertebrates only begin to scratch the surface of this biodiverse group, and additional surveys could yield many hundreds more species. While insects represented the bulk of recorded invertebrates with 321 species, we also identified 30 spiders and mites, three mollusks, one nematode, and a fairy shrimp.

Relative to the sheer biodiversity of invertebrates, very few species have been assessed for potential listing as a species of conservation concern. Butterflies, dragonflies, damselflies, tiger beetles, and a few other well-studied insect groups are the exception to this trend. As more data becomes available through research projects, including community science databases like iNaturalist, initial working groups have been formed to begin conservation status assessments. Data points from this study that were submitted to iNaturalist are already helping inform potential inclusion of several insect species within the forthcoming 2025 update to the New Hampshire State Wildlife Action Plan.

Only one of the currently state-listed invertebrate species of greatest conservation need, the Yellowish Cuckoo Bumble Bee, was observed at Sharon Town Forest. We photographed an adult male bee pollinating common milkweed (*Asclepias syriaca*) in the log landing near McCoy Road during the July 6 bioblitz. Repeated surveys of Meadow Brook's wetlands detected a robust population of Two-spotted Skippers within four separate emergent wetlands. This species is newly proposed as a species of greatest conservation need in New Hampshire. Statewide surveys are still ongoing, yet Sharon Town Forest's population of this uncommon butterfly may be one of the largest in New Hampshire. While undetected at the property, Monarchs, likely use the property for nectaring resources during fall migration and may lay eggs on common milkweed plants found in the patch cut areas and the McCoy Road log landing. Monarchs are a species of greatest conservation need in New Hampshire and eastern migratory subspecies has been petitioned for listing on the federal endangered species list due to >80% population decline since the 1990s.

Yellowish Cuckoo Bumble Bees are unlike common bumble bees in that they usurp the nests of other bees and exploits the worker bees to feed her and her developing young.

The property hosts many Two-spotted Skippers, a rather uncommon butterfly.

Sharon Town Forest also hosts four invertebrate species of regional conservation concern, whose populations are fragmented and declining primarily due to habitat loss. They are the Silver-bordered Fritillary

(butterfly), Harris's Checkerspot (butterfly), Southern Pygmy Clubtail (dragonfly), and Elfin Skimmer (North America's smallest dragonfly). Beyond the relatively well-studied butterflies, dragonflies, and damselflies, much less data has been collected on other invertebrate groups by scientists and naturalists. By reporting field observations of invertebrates to iNaturalist, the Sharon Town Forest ecological inventory and stewardship plan actively contributed natural history information to the scientific consensus for dozens of species.

Four species of regional conservation concern (clockwise from top left (Silver-bordered Fritillary, Harris's Checkerspot, Southern Pygmy Clubtail, and Elfin Skimmer.

Numerous invertebrates documented through this effort represented first-known records for Hillsborough County, New Hampshire, and even New England, helping fill spatial gaps in the collective understanding of these species' geographic distributions (Table 3). Within the framework of this project, first records were determined by searching the publicly-accessible iNaturalist database, Global Biodiversity Information Facility database, and New Hampshire Dragonfly Survey (Hunt 2012). Prior records for some species may exist in private collections, personal lists, or other unpublished resources. For the time being, it remains unknown if these noteworthy species are truly rare, uncommon, or simply overlooked common species. More research is needed regionally to determine species distributions, population trends, and conservation statuses.

Table 4. Partial list of notable insects observed at Sharon Town Forest. Noteworthiness acronyms used: NE = New England, NH = New Hampshire, HC = Hillsborough County.

Common Name	**Scientific Name**	**Taxonomic Group**	**Noteworthiness**
Eastern Red Damsel	*Amphiagrion saucium*	Damselflies	New record for Sharon; Uncommon in NH
Silver-bordered Fritillary	*Boloria myrina*	Butterflies	Regional species of conservation concern
Yellowish Cuckoo Bumble Bee	*Bombus flavidus*	Bees	NH Species of Greatest Conservation Need
Superb Jewelwing	*Calopteryx amata*	Damselflies	Uncommon in NH
Curved Halter Moth	*Capis curvata*	Moths	First public record for HC
Harris's Checkerspot	*Chlosyne harrisii*	Butterflies	Regional species of conservation concern

Common Name	Scientific Name	Taxonomic Group	Noteworthiness
Maine Leaf Beetle	*Chrysomela mainensis*	Beetles	First public record in southern NH
Charcoal Deer Fly	*Chrysops carbonarius*	Flies	First public record in HC
Macquart's Deer Fly	*Chrysops macquarti*	Flies	First public record for HC
Tubercle-faced Reed Beetle	*Donacia tuberculifrons*	Beetles	First public record in NE
Three-spotted Concealer	*Eido trimacuella*	Moths	First public record in HC
Goldcap Moss-Eater	*Epimartyria auricrinella*	Moths	First public record in HC
Bog-dwelling Drone Fly	*Eristalis cryptarum*	Flies	First public record in southern NH
Two-spotted Skipper	*Euphyes bimacula*	Butterflies	Proposed species of greatest conservation need in NH
	Fitchia aptera	True Bugs	First public record in NH
	Idiodonus kennicotti	True Hoppers	First public record for NH
Southern Pygmy Clubtail	*Lanthus vernalis*	Dragonflies	First public record for HC; regional species of conservation concern
Bilobed Looper Moth	*Megalographa biloba*	Moths	First public record in HC
Elfin Skimmer	*Nannothemis bella*	Dragonflies	New record for Sharon; regional species of conservation concern
Gracile Nomad	*Nomada gracilis*	Bees	First public record in HC
	Ochterus banksi	True Bugs	First public record in northern NE
Metallic Reed Beetle	*Plateumaris metallica*	Beetles	First public record in HC; second public record in NH
Red Aquatic Leaf Beetle	*Plateumaris rufa*	Beetles	First public record in HC
Shoemaker's Reed Beetle	*Plateumaris shoemakeri*	Beetles	First public record in HC
Sober Renia Moth	*Renia sobrialis*	Moths	First public record in HC
	Rhopalomyia hirtipes	Flies	First public record in NH
Dark Brown Scoparia Moth	*Scoparia penumbralis*	Moths	First public record in HC
Sedge Billbug Weevil	*Sphenophorus costipennis*	Beetles	First public record in NH; third public record in northern NE
Eastern Least Clubtail	*Stylogomphus albistylus*	Dragonflies	New record for Sharon
	Trialeurodes pergandei	Flies	First public record in northern NE

Not all, but many of Sharon Town Forest's noteworthy insects depend on habitats associated with Meadow Brook. This includes Meadow's Brook high-quality waters, varied riverine substrate, and diverse vegetation within adjacent emergent and shrub wetlands. Many of these wildlife resources are threatened by expanding concentrations of glossy buckthorn.

New England's first public record of Donacia tuberculifrons.

FOREST PEST AND PATHOGENS

As with many forests in southern New Hampshire, one or more forest pests and pathogens negatively impact the health of key tree species. Forest pests, often an insect or nematode, and pathogens, like some fungi and diseases, constitute a major threat to New Hampshire's forests, especially when the threat is non-native and lacks biological or climatic controls. For example, Emerald Ash Borer (*Agrilus planipennis*) has rapidly spread throughout New Hampshire's southern nine counties since it was first detected in Concord in 2013, and this east-Asian species is well-adapted to New Hampshire's climate. The larvae of this small beetle bore into and consume the living bark tissue of ash trees, leading to widespread ash die-off. In forest stands where high concentrations of Emerald Ash Borers have been present for five or more years, ash canopy mortality can reach 100%. According to data from NH Forest Health Bureau, Emerald Ash Borers were first reported from Sharon in 2021. At Sharon Town Forest, surveys uncovered several forest pathogens including Emerald Ash Borer. Many white ash trees at the property displayed symptoms borer infestation while others have already deceased. A modest number of healthy white ash trees remain for the time being.

Other non-native pests and pathogens stressing trees at Sharon Town Forest include Elongate Hemlock Scale (*Fiorinia externa*), Hemlock Woolly Adelgid (*Adelges tsugae*), Beech Bark Disease (*Neonectria faginata*), and Beech Leaf Disease (*Litylenchus crenatae*). As their names imply, eastern hemlock and American beech are the affected species. Sharon Town Forest contains thousands of individual hemlock and beech trees and saplings. Hemlock Woolly Adelgid and Elongate Hemlock Scale are two nearly-microscopic insects that feed on sap produced by host trees. Either insect can kill a host plant within 10 years, and this process is sometimes hastened if both pests are present. Beech Bark Disease affects the bark of a high proportion of beech trees at Sharon Town Forest. This disease stresses affected trees and reduces the likelihood of reaching a mature age. Fortunately, the canker fungus does not quickly kill trees.

A new threat, Beech Leaf Disease, may pose a more serious threat to the property's beech trees, as this potentially wind-dispersed nematode has explosively spread in New Hampshire since its introduction in 2022. This pathogen appears to spread on American beech leaves in the understory and midstory, killing the leaves partway through the year. As a result, affected trees suffer from reduced rates of photosynthesis, leading to poor nutrition and reduced carbon sequestration which can result in death of individuals in about five years. At other sites in New England where Beech Leaf Disease has been present in a forest for 3 or more years, some beech-dominated midstories and understories have expressed 80-100% defoliation, leading to a significant reduction of beech regeneration. State and Federal forest scientists are unsure how Beech Leaf Disease and related pests will impact New Hampshire forests over the long term.

Rather than suffering widespread impacts from a non-native species, the insect currently causing the most forest change at Sharon Town Forest is the Hemlock Looper moth. These medium-sized, tan moths are easily visible in September and October after caterpillars have metamorphosed into butterflies. Native to North America, Hemlock Looper populations cycle through boom-and-bust years as a technique to evade the constant predation pressure from forest songbirds. Population spikes can occur as frequently as every 11 to 15 years, and these spikes can cause widespread defoliation across entire hemlock stands, as was the case at Sharon Town Forest in 2021-2022 when an estimated 275 acres of hemlock forest and mixed-hemlock forest were

affected. Hemlock Looper outbreaks can last up to three or four years, and no practical control measures exist.

Fortunately, natural disturbances such as this also provide many benefits to large forested ecosystems. First, the once shadow-laden forest floor now receives abundant sunlight due to the defoliated hemlock canopy. Hardwoods, primarily birches and maples, have formed dense patches of regenerating seedlings. Canopy openings like these typically increase understory vascular plant diversity. Second, new gaps in the forest canopy and midstory increase structural heterogeneity within the property bounds and the landscape. Heterogeneous forests, characterized by varied vertical and horizontal structure and diverse tree species, significantly contribute to a forested ecosystem's long-term biodiversity, overall ecological health, and climate resiliency. Third, as dead-standing hemlocks fall and decompose, sequestered carbon remains on-site and is cycled into Sharon Town Forest's soils. Regenerating trees within the affected hemlock stands also rapidly intake additional carbon from the atmosphere, which helps improve air quality and combat climate change. Fourth, structural heterogeneity and large downed trees are key characteristics of old growth forests. By allowing natural processes to take their course within the affected stands, the forest will continue progressing towards old growth and thereby expand upon the scattered distribution of this rare forest type in New England.

The forest communities of Sharon Town Forest will change in response to the combined pressures of a changing climate and forest pests and pathogens. Additional research and monitoring can better answer the questions of how, where, and how much the forest will change at this important property. Yet in the coming decades, we predict that white ash and eastern hemlock will decline significantly and American beech regeneration may slow. In response, impacted forest communities may shift towards a higher abundance of oak, birch, and maple. In the long-term as the climate continues to warm, cold-adapted species such as balsam fir, red spruce, and yellow birch will likely gradually be replaced by oaks, hickories, and other more southern species better adapted to projected future conditions.

Hardwood seedlings robustly regenerate the understory of Sharon Town Forest's low-elevation hemlock stands following the Hemlock Looper outbreak.

LANDSCAPE CONTEXT

UNFRAGMENTED LAND BLOCKS

Anthropogenic development divides our landscape into discrete, fragmented blocks of natural land cover. This division of land occurs when roadways are created to support our built infrastructure, including residential, commercial, and industrial developments. The continuous development of new roadways and other projects further fragments large forested blocks, which eventually creates a mosaic of smaller unfragmented forest blocks that can no longer support robust wildlife and plant populations. Many types of wildlife depend on large unfragmented lands for survival and successful reproduction, including North American River Otters, American Black Bears, Bobcat, American Goshawk, and even small songbirds such as the Ovenbird.

Adapting a landscape-scale perspective is critical when assessing the impact of habitat fragmentation, as natural resources and processes (e.g., wildlife dispersal and migration) do not observe political boundaries and the pattern and distribution of unfragmented land blocks is rarely observed at the parcel scale. Thus, it is important to consider not only the area immediately adjacent to the Sharon Town Forest, but also the surrounding landscape. This approach provides a better perspective for understanding potential species presence and ecological integrity of the local landscape in light of current development patterns. For the purposes of this project, fragmenting features were defined as all state, town, and local roads, and these features received a buffer of 500 feet to encompass the area within which buildings are most often constructed relative to roadways. Lacustrine, or lake-like, wetlands were also excluded to better capture the upland habitats preferred by most large-bodied, wide-roaming vertebrates. Class VI roads, private roads, and driveways present fewer risks to wildlife, and were not considered significant fragmenting features. The remaining areas denote relatively unfragmented blocks of land that exhibit a variety of natural habitats such as forests, wetlands, streams, and ponds. In some instances, vegetated human-modified areas beneficial to some wildlife (e.g., hayfields and other agricultural fields) are also included within unfragmented land blocks.

Sharon Town Forest stretches horizontally across an unfragmented land block measuring 1,844 acres in size (Figure 13). Field surveys detected a diverse assemblage of species, many of which require large intact natural habitats free of human disturbance. While not insignificant, unfragmented habitat blocks of this size typically lack enough resources to fully support Bobcats, North American River Otters, American Black Bears, Coyotes, Fisher, Moose, and other area-sensitive species found at Sharon Town Forest. For these species, the unfragmented habitat block associated with the study area plays a critical role in patchworking together the minimum area required to meet their basic biological needs amidst an increasingly fragmented landscape. The presence of numerous area-sensitive species at Sharon Town Forest underscores the importance of this biological stronghold. Future residential development around the periphery of the contiguous land block associated with Sharon Town Forest would gradually chip away unfragmented land available to wide-roaming species. Conserving existing wildlife corridors between nearby large patches of unfragmented habitat will help protect the property's long-term attractiveness to Moose, Bobcat, and many other species that visit on a regular basis.

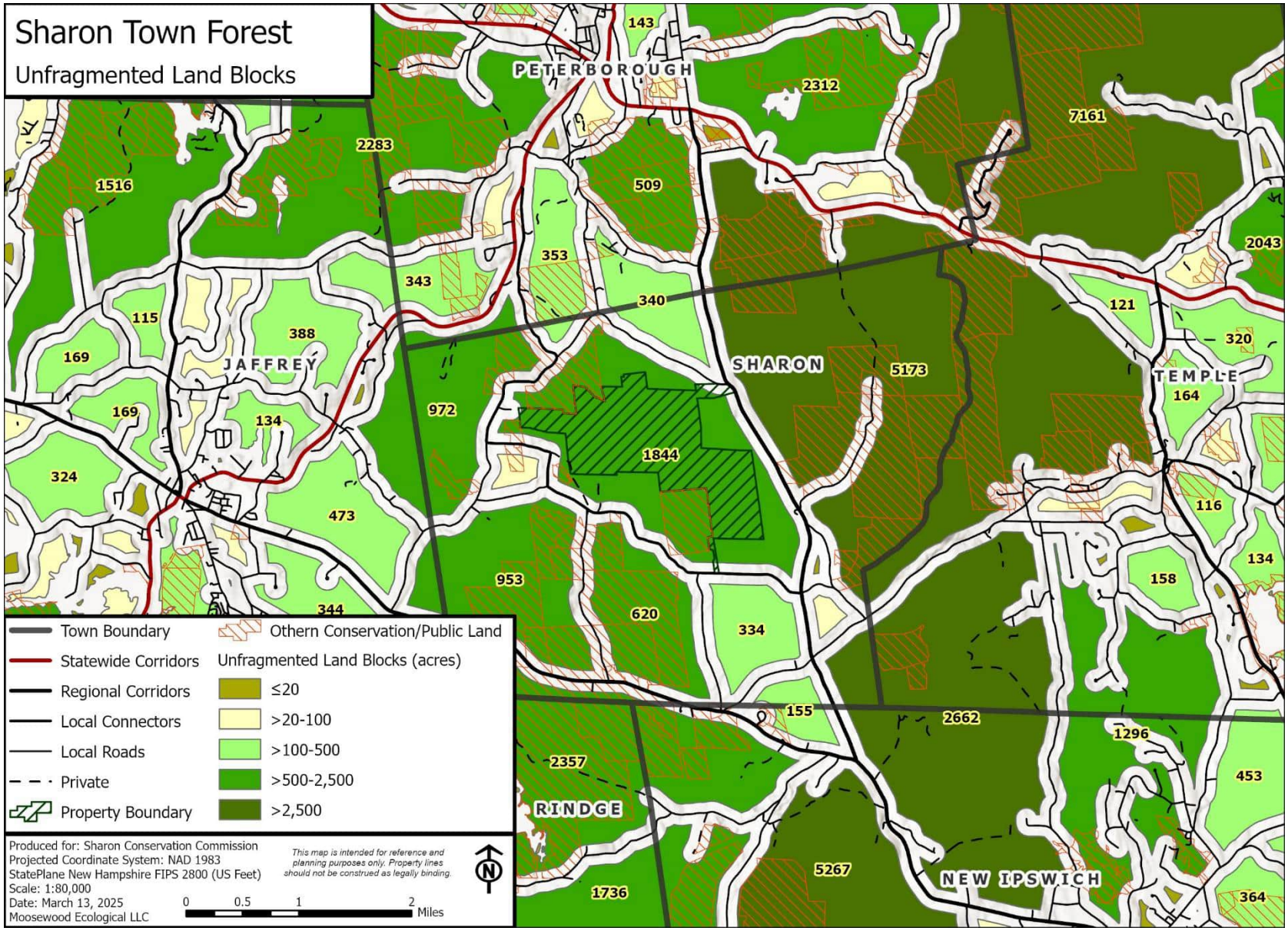

Figure 13. Unfragmented land blocks in the greater Sharon area.

WILDLIFE CORRIDORS

Large unfragmented landscapes provide wildlife with unimpeded access to critical resources and the ability to safely move to new territories. This connectivity is imperative for the long-term survival of many wildlife populations, especially such wide-roaming species as Moose, American Black Bear, Coyote, Bobcat, North American River Otter, Mink, and Fisher. Connectivity hotspots can take many forms, although various species often seek natural pathways along wetland edges, riverbanks, other riparian areas, ridgelines, field edges, and even some recreational trails and utility rights-of-way. Wildlife corridors are not only significant for mammals but are equally important for amphibians, turtles, fish, and other aquatic species. For aquatic and semi-aquatic species, wildlife corridors typically follow streambeds, rivers, and connected wetlands. Organisms utilizing these natural riverine corridors often must navigate frequent road crossings, where poorly-designed culverts can restrict or prevent safe passage.

To raise awareness about wildlife corridors and help prioritize the protection of key corridors, New Hampshire Fish and Game modeled primary and secondary wildlife corridors statewide. They used 16 focal species for their analysis, capturing the movement habits of several turtle species, snakes, mustelids (members of the weasel family including North American River Otter, Mink, and Fisher), lagomorphs (rabbits and hares), North American Porcupine, Bobcat, American Black Bear, and Canada Lynx. The resulting primary wildlife corridors represent top-scoring linkages for all focal species combined and may benefit multiple wildlife species with a variety of dispersal behaviors, whereas secondary corridors represent top-scoring linkages for each focal species when considered individually.

According to statewide modeling by New Hampshire Fish and Game, Sharon Town Forest protects 403 acres, or 62.6%, of a 644-acre priority habitat block associated with Meadow Brook's Tier 1 and Tier 2 habitats (Figure 14). This priority block reflects the area's unfragmented habitat and widespread presence of Tier 1 and Tier 2 habitats insulated by the wide border of undeveloped Tier 3 forests. The Town Forest provides important connectivity to wildlife traveling across Sharon, especially large-bodied mammals traversing between Annett State Forest in Rindge and protected forests along the Wapack Range in eastern Sharon and western Temple.

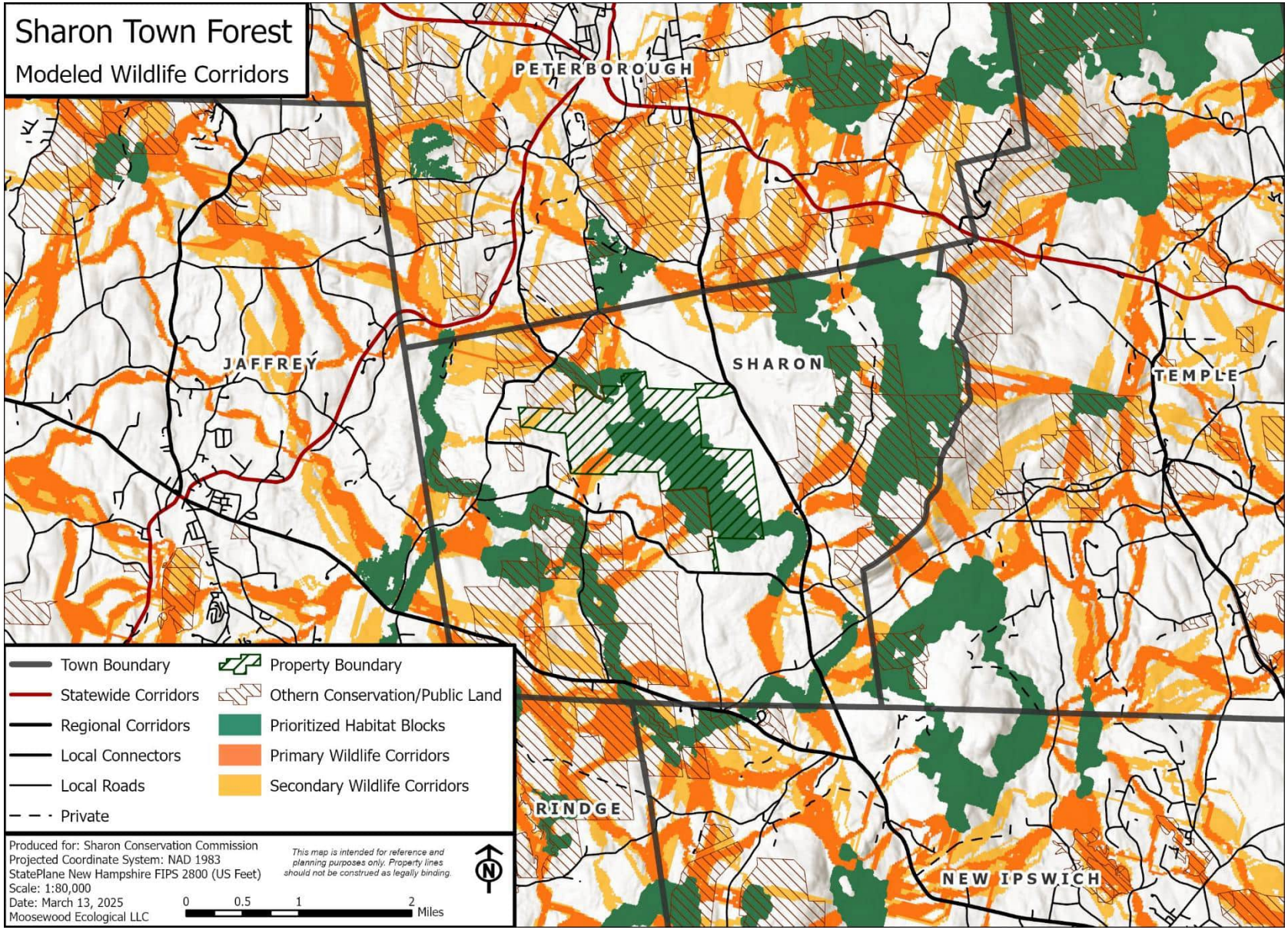

Figure 14. New Hampshire Fish and Game's modeled wildlife corridors and priority habitat blocks for the greater Sharon area.

WILDLIFE HABITATS RANKED BY ECOLOGICAL CONDITION

In addition to evaluating wildlife habitats across the entire state, the New Hampshire State Wildlife Action Plan also identified where these habitats exist in the best ecological condition based on biodiversity, habitat arrangement, and minimal human impact. This analysis, updated every five years (most recently in 2020), ranks habitats into four tiers to guide conservation priorities:

- Tier 1: Highest Ranked Habitat in New Hampshire – The top 15% of each habitat type, prioritizing rare habitats, known locations of listed species, and exemplary natural communities.
- Tier 2: Highest Ranked Habitat in Biological Region – The next highest 30% of habitat within each biological region, excluding areas already in Tier 1.
- Tier 3: Supporting Landscapes – The remainder of the top 50% of each habitat type.
- Not Ranked – Developed areas, lower-quality natural habitats, and small patches (<1 acre) of high-quality habitat surrounded by development.

All three ranked tiers are significant for wildlife and provide a broad conservation framework. However, finer-scale features of ecological importance (e.g. vernal pools) may not always be reflected in the SWAP's statewide analysis due to data limitations.

At Sharon Town Forest, approximately 44% of the property qualifies as Tier 1 (171 acres) or Tier 2 (235 acres) habitat (Table 5), making it some of the most important habitat in New Hampshire and the Worcester/Monadnock Plateau ecoregion. This ecoregion extends north from Massachusetts's Quabbin Reservoir to Walpole, New Hampshire as well as covering a large swath of land between Worcester, Massachusetts and New Hampshire's Belknap County. Tier 1 and Tier 2 habitats are closely associated with Meadow Brook and adjacent uplands within the Town Forest, recognizing this site's prime ecological condition from a landscape perspective (Figure 15). The SWAP ranked an additional 435 acres of Sharon Town Forest at Tier 3, important supporting landscapes. Sharon's Gridley River and nearby Temple Mountain represents the only other large patches of Tier 1 habitat within Sharon.

Table 5. Acreage of State Wildlife Action Plan habitat tiers at Sharon Town Forest.

Habitat Tier	Acres*	Percent of Property
1	171.2	18.6%
2	234.9	25.5%
3	434.7	47.3%
Not ranked	79.1	8.6%

** Note: acreage calculations in ArcGIS yielded a property size of 920 acres, which differs from the stated property size (891 acres) in Town of Sharon documents.*

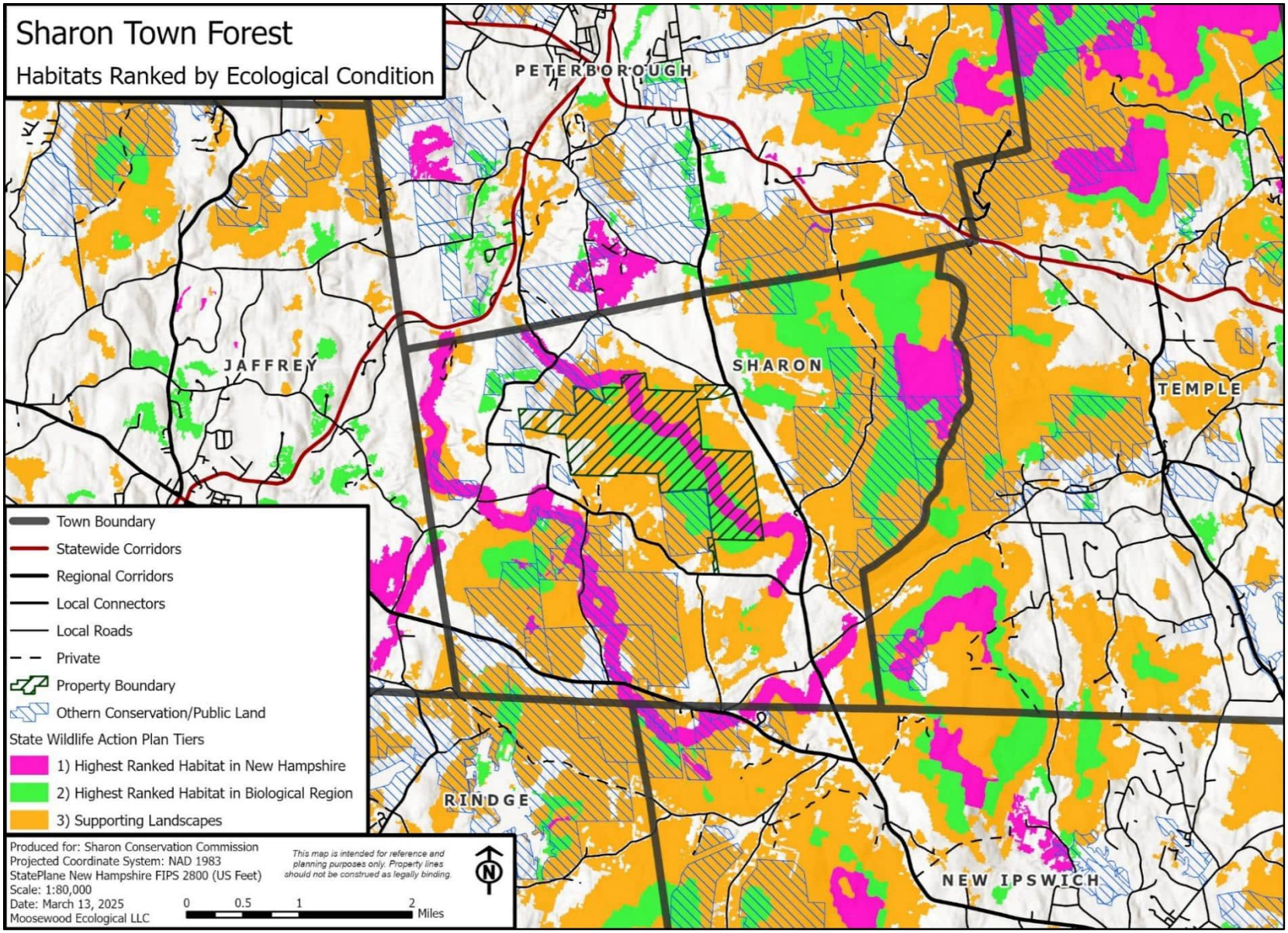

Figure 15. State Wildlife Action Plan habitats ranked by ecological condition in the greater Sharon area.

CLIMATE CHANGE AND RESILIENT LANDSCAPES

In response to the changing climate, many communities, organizations, and landowners are now incorporating the concept of resiliency into their proactive planning efforts. The concept of ecological resiliency refers to the capacity of wildlife and plants, and the natural processes and physical conditions they depend on, to sustain change over time. Resiliency studies attempt to predict how landscapes may respond to a changing climate and such studies specific to the Northeast factor in long-term forecasts for extreme temperatures, higher average annual temperatures, shorter winter seasons, increasing intensity and frequency of storms, flooding, and rising sea levels. When it comes to measuring the degree of climate resiliency offered by a landscape, scientists look at three broad characteristics.

The first characteristic, geophysical diversity, measures the diversity of bedrock and surficial geology, soils, elevations, landforms, and water features such as lakes and streams. Geophysical diversity promotes both habitat and species diversity by providing a broad spectrum of ecological conditions and microclimates. In the event of disturbance, either from human activity or weather, landscapes with greater geophysical diversity can recover more quickly than more homogenous landscapes. The second characteristic, connectedness, measures the ability of species to freely move throughout landscapes unimpeded by significant barriers such as major roadways, human development, or anthropogenic features. Connectedness applies to all spatial and temporal scales, from the short, seasonal movements of amphibians seeking vernal pools to centuries-long shifts in the geographic distribution of plants. More resilient landscapes offer a high degree of connectedness through intact, unfragmented landscapes, which better facilitate both near-term and long-term movement of plants and wildlife.

The third characteristic, biological condition, takes into consideration the impact of environmental stressors, including past land use, human development, invasive species, and air and water pollution. Landscapes with fewer of these stressors maintain a higher degree of resiliency, as healthier, less-stressed ecosystems can more efficiently maintain their ecosystem services (e.g., air and water filtration, carbon sequestration, floodwater storage). Biological condition also accounts for the presence of species of greatest conservation need and exemplary natural communities.

In 2016, The Nature Conservancy released their Resilient and Connected Landscapes study, which mapped climate-resilient sites, locations of confirmed biodiversity, intact landscapes, and predicted zones of species movement associated with climate-induced range shifts across eastern North America. This study used these factors to prioritize conservation efforts across a network of climate-resilient sites integrated with connecting corridors. In turn, this process effectively created a blueprint for regional conservation that represents all habitats and gives nature space to adapt. The Nature Conservancy's analysis identified the following concepts and definitions:

- Resilient Area: places buffered from climate change because they contain many connected microclimates that create climate options for species as they respond to climate change (i.e., high geophysical diversity).

- Flow: the gradual movement of species populations over time in response to changing climates (i.e., connectedness). Flow tends to concentrate in the zones and corridors described below.
- Climate Corridor: narrow zone of highly concentrated flow, often along waterways or ridgelines.
- Climate Flow Zone: broad areas of high flow that are less concentrated (diffuse) than in concentrated corridors - typically intact forested regions.
- Recognized Diversity: sites with diverse landform types and geophysical settings, known locations of rare species or unique communities based on ground inventory, or sites otherwise known for their current biodiversity value (i.e. high biological condition). Unconfirmed areas may contain the same species.

Resilient sites are projected to retain high-quality habitat and continue to support a diverse array of plants and animals. Areas exhibiting both complex topography and connected land cover represent high-priority locations for conservation as these sites are expected to be of higher value to plants and wildlife in the long term. Fortunately, either knowingly or unknowingly, land trusts and other stakeholders throughout New Hampshire have protected many climate-resilient sites identified by The Nature Conservancy, including Sharon Town Forest. Conservation easements and deed restrictions serve as two tools for land conservation, and they can help ensure that climate-resilient areas continue to provide critical habitat and connectivity for species in a changing climate.

Building upon Sharon Town Forest's ecological significance at local and regional scales, the property's landscape connectivity, variable terrain, natural communities, and wildlife habitats promote a relatively high degree of climate resiliency according to The Nature Conservancy's national assessment. Much of Sharon Town Forest, especially the property's central Meadow Brook drainage overlaps with a nationally-recognized area of high climate resiliency, high climate flow, and recognized biodiversity (Figure 16). The Nature Conservancy's dataset of climate resilient and connected sites also depicts highly resilient lands to the east and south of the Town Forest, as well as throughout most of northeastern Sharon and elsewhere. Based on The Nature Conservancy's evaluation, these regions of Sharon contain the town's most significant lands if prioritizing landscape-scale biodiversity. All of Sharon's wildlife habitats and natural communities face pressure from climate change, invasive plants, and forest pests, yet Sharon Town Forest's resiliency and connectivity make the property more adaptable than smaller, less diverse, and more isolated forests elsewhere in the region. Continued permanent conservation efforts of Sharon's climate-resilient lands would provide plants and wildlife with a viable long-term refuge and as they respond to transforming ecosystems and Earth's changing climate.

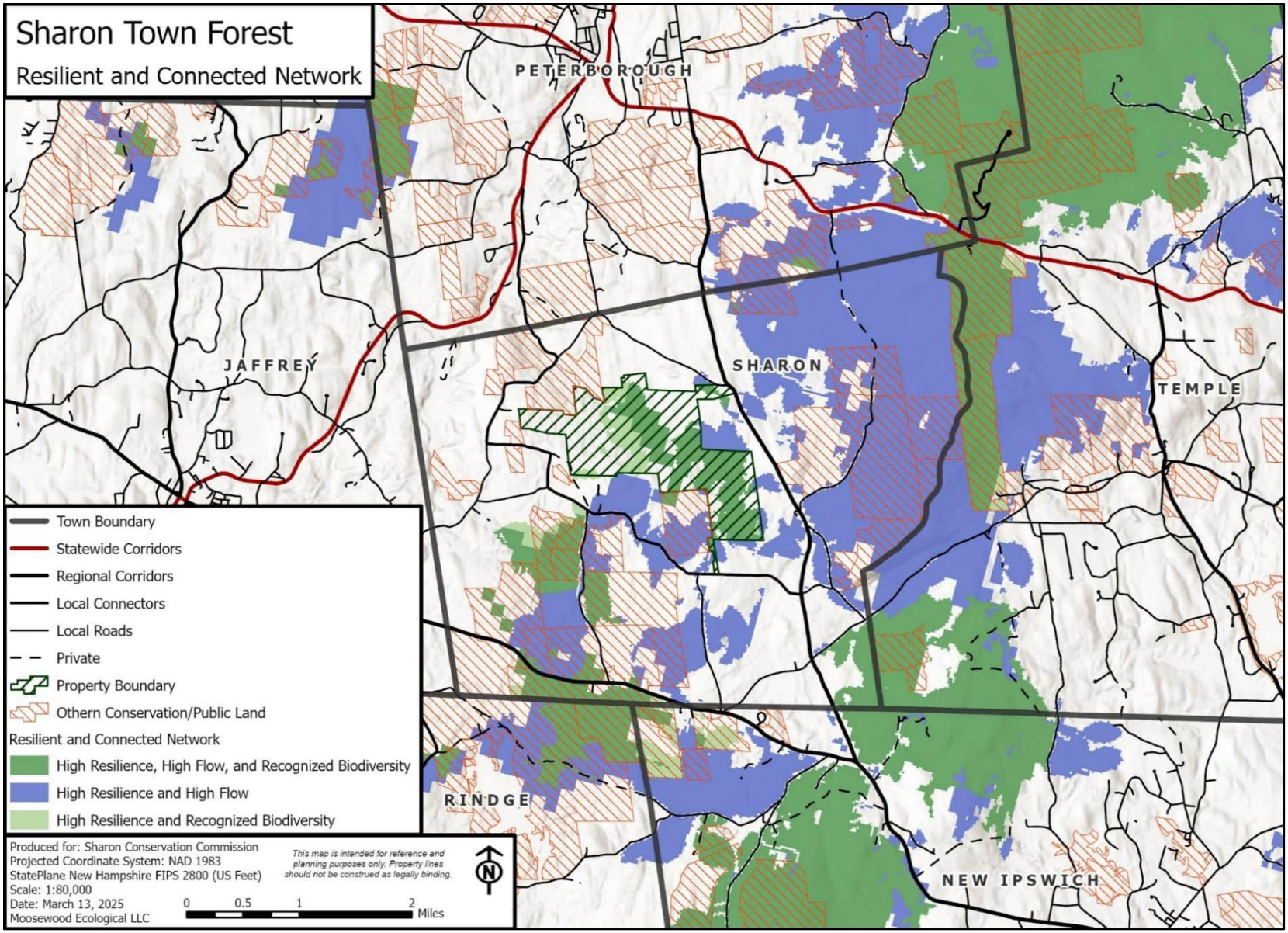

Figure 16. The Nature Conservancy's national model of climate-resilient and connected lands within the greater Sharon area.

WILDLIFE HABITAT AND FOREST STEWARDSHIP

Stewardship is an ethic that embodies the careful and responsible management and supervision of Sharon Town Forest, whereby safeguarding its natural resources. The following recommendations are based on this ethic and guided by the nine stewardship strategies outlined below.

- Maintenance of soil productivity;
- Protection of water quality, wetlands and riparian areas;
- Maintenance or enhancement of wildlife habitat;
- Maintenance or enhancement of the overall quality of the forest;
- Diversification of age classes to promote a healthy balance of early, mid, and late successional forest stands to support overall biodiversity;
- Protection of unique or fragile natural areas;
- Protection of unique historic or cultural features;
- Conservation of native plant and animal species, and natural communities; and
- Incorporation of the effects of climate change to promote ecological resilience for long-term health.

RECOMMENDATIONS AND STRATEGIES

We recommend the following short and long-term strategies to achieve wildlife habitat and forest stewardship based on site-specific, data-driven information acquired during the Sharon Town Forest ecological inventory. These strategies were based on the stewardship of species of conservation concern, current forest conditions, past land use, and protection of ecologically significant areas while maintaining and enhancing overall biodiversity on Sharon Town Forest. Also addressed is the protection of soils and productivity, as well as the protection of historical and cultural features and basic trail recommendations.

Maintain, Enhance, and Protect Native Biodiversity, Habitats, and Species of Concern

The following strategies are long-term solutions to maintain, enhance, and protect native biodiversity, habitats, and species of concern. These were based on our current understanding of Sharon Town Forest. These general strategies should be considered

- Maintain a diversity of forest age classes, densities, and structures that promote various stages of forest stand development. This will create a variety of habitats to promote biodiversity and forest health through:
    - Creation of an overall uneven-aged forest throughout the property through timber harvesting that results in 3 age classes, including *early, mid, and late-successional/old growth forests*
    - Enhancement of wildlife habitats for species of conservation concern that are known to use the property
    - Improvement of genetic stand quality and regeneration for a more resilient forest
    - Improvement of understory forest habitat, providing cover and browse for many species of wildlife.

- We recommend implementing the use of forestry techniques found in Silviculture with Birds in Mind (Hagenbuch et al 2011) developed by Vermont Audubon and the State of Vermont. This can help to achieve uneven-aged forest habitats. This guide focuses on wildlife habitat and forest stewardship that uses silvicultural methods to enhance habitats for a representative group of birds of conservation concern, many of which use the property during the breeding and migratory seasons. This provides a good example of how silviculture can produce positive outcomes for land stewardship.
- Improve understory forest habitat, cover, and browse. The use of silvicultural techniques can help achieve this objective. The use of single-tree and small group selections during timber harvests can mimic natural disturbances. These are important elements to diversify the wildlife habitats and to enhance populations of species of conservation concern.
- Encourage land stewardship activities that favor known and potential species of conservation concern.
- Limit timber harvests to mid-August to March when possible. This will help to limit incidental impacts to wildlife particularly during the breeding season for vernal pool amphibians and birds.
- Develop and maintain snag and cavity trees, which provide critical nesting and denning sites for many wildlife. The following size classes provides guidance.
    - 12-15 inches: softwoods = 5 trees/acre and hardwoods = 4 trees/acre
    - >15 inches: softwoods = 3 trees/acre and hardwoods = 1 tree/acre
- Minimize or eliminate the need for stream crossings during silvicultural activities.
- Minimize construction of new roads and landings where possible. Keep sensitive habitats (such as vernal pools, seeps, wetlands) free of skidder roads and other mechanized operations, including new landings
- During logging operations, allow dead standing and downed woody debris to decompose naturally, leaving these materials to the extent possible to contribute to natural processes and allowing woody material to support small wildlife such as mice, salamanders, frogs, snakes, and insects.
- See strategies outlined below for Invasive Plants Management and Monitoring.
- See strategies outlined below for Protect Water Quality, Ecologically Significant Areas, and Unique Natural Areas.

Protect Water Quality, Ecologically Significant Areas, and Unique Natural Areas

The following strategies provide suggested measures for the long-term protection of water quality, ecologically significant areas, and unique natural areas. These include designating an ecological reserve, as well as establishing naturally vegetated buffers around wetlands, streams, and vernal pools.

- For water quality protection meet or exceed Best Management Practices (BMPs) for Forestry: Protecting New Hampshire's Water Quality (Moesswilde 2005) and Good Forestry in the Granit State: Recommended Voluntary Forest Management Practices for New Hampshire (Bennett 2010; a revised draft is planned to be completed later in 2025). These guidelines should be used during any forestry project.

- Maintain naturally vegetated buffers around permanent streams and wetlands using a tiered forested buffer. The proposed buffer system would include 3 distinct management zones within 500 feet of Meadow Brook and associated wetlands. The following provides one scenario to achieve resource protection while affording opportunities for forest management (Table 6). Exceptions may include the necessity for ecological restoration based on site-specific conditions and the risk to the ecosystem.
    - Maintain, at a minimum, 100-foot forested riparian buffers around wetlands and on either side of Meadow Brook as a no-cut zone where no equipment is allowed. Seventy-five percent of the forest canopy should be maintained within the next 200-foot zone and fifty percent of the forest canopy should be maintained within the next 200-foot zone.
    - The forested riparian buffer edge shall be measured from the stream edge of the normal high-water mark of the stream. In cases where wetlands surround the stream edge, the forested riparian buffer edge shall be measured from the boundary of the upland edge of the wetland area.
- Maintain naturally vegetated buffers around intermittent streams using a tiered forested buffer. The proposed buffer system would include 2 distinct management zones within 50 feet of the streams. The following provides one scenario to achieve resource protection while affording opportunities for forest management (Table 6). Exceptions may include the necessity for ecological restoration based on site-specific conditions and the threat to the ecosystem.
    - Maintain, at a minimum, 50-foot forested riparian buffers around all intermittent streams whereas a 25-foot no-cut zone is established where no timber extraction is allowed next to the intermittent stream and single tree harvesting can occur with the next 25-foot riparian buffer whereas 50% canopy cover should be maintained within the entire 50-foot forested riparian buffer.
    - Streams crossing should be avoided or minimized when possible.
- Maintain naturally vegetated buffers around vernal pools using a tiered forested buffer. The proposed buffer system would include 4 distinct management zones within 400 feet of vernal pools. The following provides one scenario to achieve resource protection while affording opportunities for forest management (Table 6). Exceptions may include the necessity for ecological restoration based on site-specific conditions and the threat to the ecosystem.
    - Maintain habitat integrity of vernal pools by retaining a mostly closed forested canopy while minimizing forest floor disturbance in the upland terrestrial life zone around vernal pools for at least 200 feet. If harvesting timber adjacent to vernal pools adhere to the following guidelines. These buffers were based on the recommendations provided by Calhoun and deMaynadier (2004), a cooperative publication of the University of Maine, Maine Audubon, Maine Department of Inland Fisheries and Wildlife, Maine Department of Conservation, and the Wildlife Conservation Society.
        - Establish a no-cut zone to retain 100% canopy cover within 50 feet from the edge of the pool

        - Retain at least 75% canopy cover 50-100 feet from the edge of the pool
        - Retain at least 50% canopy cover 100-200 feet from the edge of the pool
        - Whenever possible increase buffer zones to maximize the benefit of wildlife and vernal pool habitat protection
        - Within 200-400 feet of vernal pools avoid forest openings greater than 1 acre.
    - No log landings or road construction shall be created within the above buffers.

Table 6. Forest management zones and associated forest buffer distances by aquatic feature type based on the scenarios described above.

Zone	Wetlands and Meadow Brook	Intermittent Streams	Vernal Pools
No-cut Ecological Reserve	0-100 feet	0-25 feet	0-50 feet
Retain >75% canopy cover	100-300 feet		50-100 feet
Retain >50% canopy cover	300-500 feet	25-50 feet	100-200 feet
Avoid forest openings >1 acre			200-400 feet

- Exceptions to timber harvesting in the above buffer zones may include those operations associated with ecological restoration. Consult with a qualified wildlife biologist or ecologist and forester prior to conducting ecological restoration within buffer zones. Trail maintenance may be conducted within these buffers so as not to impact water quality and aquatic habitat.
- When conducting a timber harvesting operation, a qualified wildlife biologist or ecologist should assist in identifying site-specific ecologically significant areas (i.e., vernal pools) and mark appropriate buffers based on the recommendations outlined above. This will provide accountability and assurance that ecologically significant areas will not be negatively impacted.

Designate Ecological Reserves and Special Management Zones

- Special Management Zones and Ecological Reserves are designated to help protect Sharon Town Forest's most significant natural resources over time within the larger working forest (Figure 17). This management strategy would greatly enhance forest habitat, ecological resiliency, and maintenance of overall biodiversity at Sharon Town Forest. Land stewardship and management of this type has been implemented on private, municipal, state, and federal lands. The State of New Hampshire has adopted this strategy on public lands, including Pisgah State Park. Refer to Table 6 and Figure 17 for guidance.

- Ecological Reserves have been designated to protect streams including Meadow Brook, wetlands, and vernal pools, as well as the species that depend upon these significant habitats (Figure 17). The designation of the western Ecological Reserve is based on the aggregation of productive vernal pools in close proximity to one another, affording an opportunity to provide a contiguous unmanaged forest protecting these vital resources.

The intent of all Ecological Reserves is to allow for natural processes to occur in the absence of forest management, ensuring long-term protection of these sensitive habitats and their biodiversity while supporting the development of late successional/old-growth forest characteristics. These characteristics are typically overlooked as important land management opportunities, and they represent only a small portion of our forested lands. Old forests provide important wildlife habitat and support dynamic plant communities while storing and sequestering carbon in the forest as well as the underlying soil. Exceptions for forest management within Ecological Reserves may include maintenance of existing trails and ecological restoration, such as management of invasive species as deemed appropriate.

- Special Management Zones are designated to provide additional protections associated with Ecological Reserves while providing opportunities for forest management. Management operations within Special Management Zones should be driven by a tiered forested buffer system of limited forest management activities (i.e., placement of logging roads and landings, timber extraction, equipment use, ecological restoration, trail maintenance, etc.). These zones are described in Table 6, including the two strategies listed above: "Protect Water Quality, Ecologically Significant Areas, and Unique Natural Areas" and "Maintain, Enhance, and Protect Biodiversity, Habitats, and Species of Concern."

Invasive Plants Management and Monitoring

- Develop an Invasive Species Management and Monitoring Program. The main priority should focus on restoration of Meadow Brook and its associated wetlands. This area is rapidly in need of restoration and will continue to provide a major seed source to the detriment of this ecologically significant area. Other priorities include areas associated with the recent logging event from 2012 and the associated log landing off McCoy Road, as well as along trails within and roadways adjacent to Sharon Town Forest. This would be a great way for the community to become involved with active stewardship at Sharon Town Forest.

- An integrative invasive plant management plan could be developed to identify the appropriate types of techniques needed at various locations. Removal and proper disposal of invasive plants should be in accordance with New Hampshire laws governing invasive species.

- Prior to future logging operations, areas should be assessed for the presence of invasive plants, and follow up monitoring and management, as needed, should be conducted to ensure native plant and forest regeneration occurs for the future ecological health of Sharon Town Forest and economic benefit for Sharon's residents.

Protect Soils and Maintenance of Soil Productivity

As the Town continues to use silviculture for wildlife habitat and forest stewardship it should incorporate measures that seek to protect fragile soils and maintenance of soil

productivity. Many of the following guidelines were developed by the US Department of Agriculture Natural Resources Conservation Services (NRCS). These guidelines should be used in areas of active timber harvesting, and they should be revised as new data and technology have been gathered to enhance the protection of soils and productivity.

- Limit the area of compacted soils
    - Operate equipment on established and newly designed roads and trails and minimize travel into the general forest area
    - Operate equipment on woody debris in areas of sensitive or wet soils where subsurface hydrologic conditions exist
    - Sequence forest management activities to limit the number of equipment passes
    - Use smaller or lighter equipment, track equipment, low PSI tires, and lighter loads when feasible
    - Restore heavily compacted areas to the extent possible
- Limit impacts of roads and landings
    - Follow natural contours when designing and conducting timber sales, and avoid disturbing natural drainage channels whereby minimizing stream crossings
    - Establish cover on roads and landings that are not in use
    - Limit soil disturbance and control erosion
    - Protect roads through the use of water bars/rolling dips
    - Retain downed tops and other unharvested materials to the extent possible for ground cover, nutrient cycling, organic matter retention, and wildlife habitat
- Maintain favorable conditions for forest growth
    - Control the amount of road use, and off-road travel, to prevent erosion, compaction, and disturbance of the soil surface
    - Establish cover on disturbed areas
- Retain and enhance carbon storage to support soil ecological functions
    - Maintain forest stocking for proper canopy cover
    - Maintain and add, as needed, woody material to the soil by girdling or cutting non-merchantable trees or trees of undesired species. This effort will also provide wildlife trees (or snags)
    - Use extended rotations to keep carbon on site for a longer period
    - Retain fallen trees, branches, snags, downed tops, and other unharvested materials for ground cover, nutrient cycling, and organic matter retention, to the extent possible and practical based on prescribed silvicultural techniques. Leaving these materials will contribute to natural processes to promote healthy forests and allows woody material to support small wildlife such as mice, salamanders, frogs, snakes, and insects.
- Implement forest stand improvement activities in ways that avoid or minimize soil erosion, compaction, rutting, and damage to remaining vegetation, and that maintain hydrologic conditions

- Protect site resources by selecting the method, felling direction, and timing of tree felling and heavy equipment operation. Protect soil and site resources during use of trails and landings, and limit property access with iron gates or other options, where applicable.

Hiking Trail System

- Development of new trails beyond rerouting existing trails as needed is discouraged at this time.
- If there becomes the need to reroute existing trails, refer to Figure 18 below and the corresponding document. This map is based on Planning Trails for People and Wildlife developed by NH Fish and Game (Stevens and Oehler, 2019). This document and mapping analysis was designed to help make better inform planning decisions around trail development to reduce negative impacts on sensitive habitats and biodiversity.
- Continue the policy to restrict motorized vehicles from using the property to prevent wildlife mortality and other negative impacts to habitats, natural communities, and forest regeneration, as well as to reduce the spread of invasive species.
- When necessary, use simple elevated foot bridges in wet areas to reduce damage to soils and vegetation along the trail and to discourage off-trail traveling. Often times, hikers may seek drier grounds in different seasons to avoid wet areas, creating an unintentional bypass. If rerouting a trail seems more feasible that a simple foot bridge refer to Figure 18 and Planning Trails for People and Wildlife developed by NH Fish and Game (Stevens and Oehler, 2019).

Protect Unique Historical and Cultural Features

Identify and protect unique historical and cultural features in areas of active timber harvesting and trail maintenance. There are a few knofor guidancewn cellar holes and numerous miles of stone walls present at Sharon Town Forest, providing a legacy to past human land use once European colonists began to establish homesteads. There may be other historical and cultural features present, as well as aspects that predate the arrival of Europeans. These features should be given special recognition and considered during land management activities.

Conserve Scenic Quality from Roads and Trails

Maintain at least a 50-foot naturally vegetated forested buffer along roads, trails, and scenic vistas. Exceptions for trails include areas identified for patch cuts and wildlife openings that enhance wildlife habitat. These areas of habitat management located adjacent to trails offer a wonderful opportunity for education for how silviculture can promote habitat and forest stewardship. It also affords a chance for trail users to experience different habitats and potentially observe wildlife not found in mature forests.

Identify and Mark Boundaries

Property boundaries should be clearly marked. This can be achieved with blazing and painting or placing placards on live trees. The current estimated length of the boundary is 8.8 miles. This would translate into roughly 155 placards spaced every 100 yards, and it is recommended to use aluminum roofing nails that extend sufficiently from the trunk so that the

tree is allowed to grow without engulfing the nails. The condition of the boundary markers should be assessed every 3-5 years. This will help to clearly identify the bounds of the Sharon Town Forest for adjacent landowners and to inform land stewardship activities on the property such as habitat and trails management.

Establish an Ecological Monitoring Program

A great way to get the public involved with stewardship and monitoring at Sharon Town Forest is to establish an Ecological Monitoring Program. This would provide community outreach and education while collecting long-term data to assess the effectiveness of land stewardship management. Below are some of the examples that can be incorporated into such a program.

- Vernal pool investigations
    - Inventory potential vernal pools identified on the wildlife habitats map to better understand wildlife use, particularly amphibians and reptiles.
    - Monitor vernal pools to account for seasonal and yearly variations to help inform future land stewardship activities.
    - Document vernal pools using *Identification and Documentation of Vernal Pools in New Hampshire* by Tappan and Marchand (rev. 2013).
- Bird species of greatest conservation need
    - Develop a monitoring program to better understand the distribution and relative abundance of birds over time, particularly where timber has been harvested, to determine if these actions are achieving goals for target species. These data are vital for developing adaptive land stewardship planning into the future.
- Monitor additional species of conservation concern that are currently documented as well as those observed in the future.

Explore a Carbon Credit Program

The Sharon Conservation Commission expressed interest in learning more about carbon programs for Sharon Town Forest. There are many certified carbon credit programs that the Town can explore online. Moosewood Ecological does not recommend a specific program. However, a current client is working with The Climate Trust based in Portland, Oregon.

Moosewood Ecological conducted a simple forest carbon credit analysis for Sharon Town Forest using The Nature Conservancy's Resilient Lands Mapping Tool to provide some insights into the estimates for 2020 and 2070 (Appendix F). These are based on current and future expected conditions. Importantly, the year 2020 is the "current" state of the forest, where disturbances such as timber harvests up to 2020 have been accounted for. Years 2050 and 2070 are projected carbon stocks in a 'grow-only' scenario where no disturbance nor changes in climate are considered. The grow-only scenario is an upper bound of possible carbon sequestration if no disturbance was to occur.

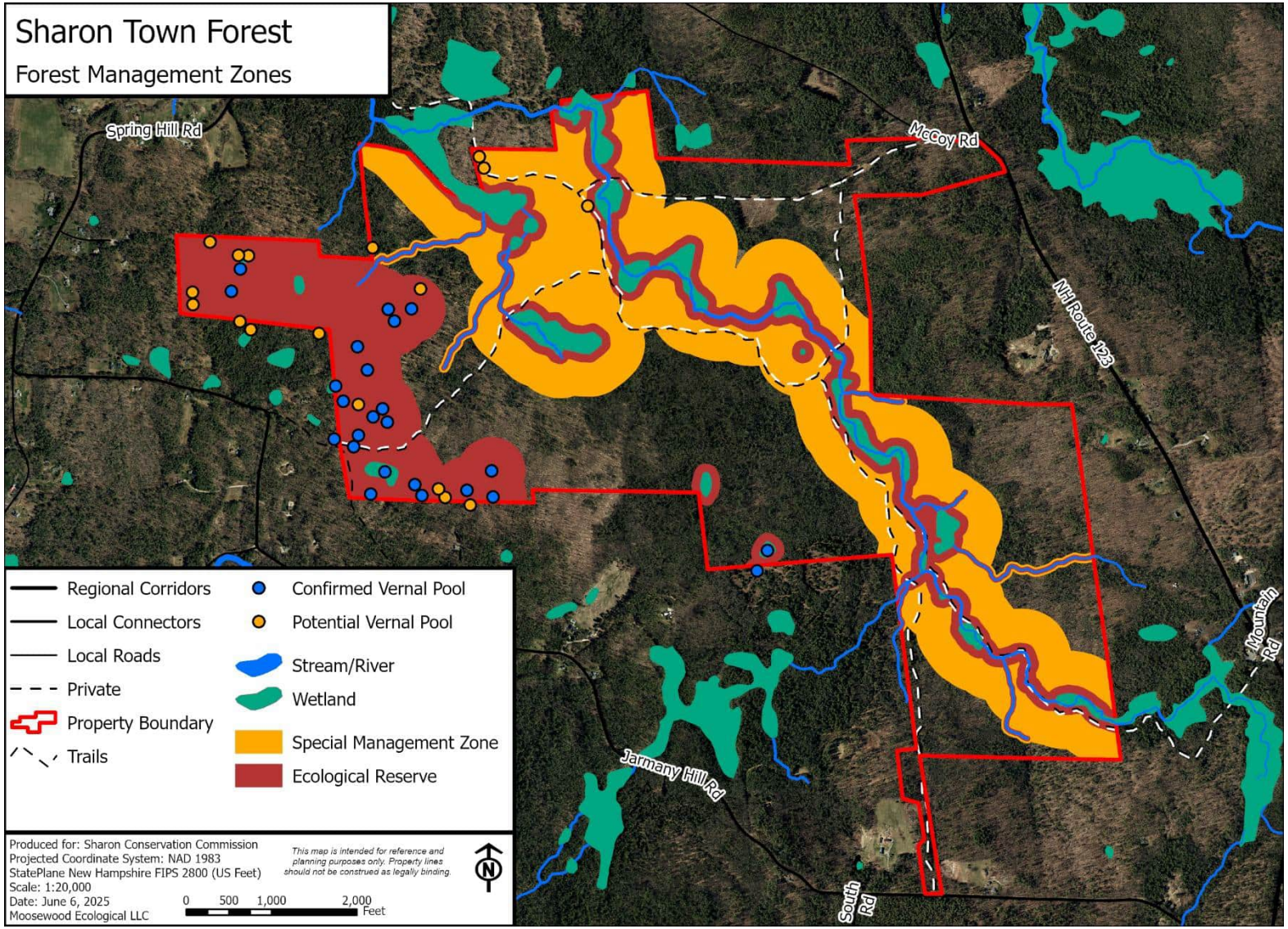

Figure 17. Special Management Zones and Ecological Reserves at Sharon Town Forest.

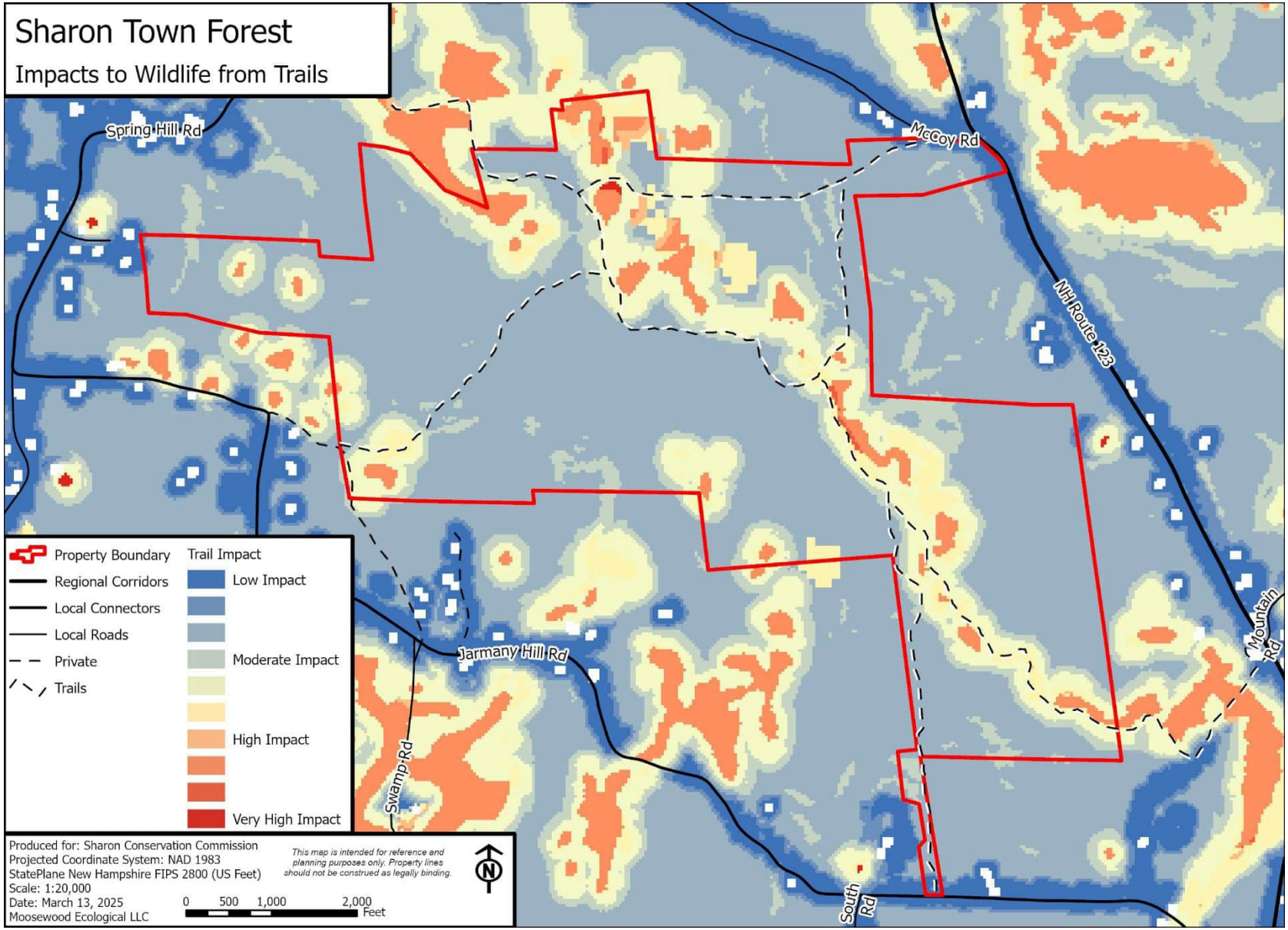

Figure 18. New Hampshire Fish and Game's *Planning Trails for People and Wildlife* model for Sharon Town Forest.

ECOLOGICAL INVENTORY CONCLUSIONS

Based the findings from this broad-spectrum ecological inventory, Sharon Town Forest contains numerous significant ecological resources of high conservation value. Our field observations largely validated many of the findings from the natural resources inventory developed by Van de Poll (1996), and we confirmed 31 species of conservation concern actively using the property for one or more parts of their life cycles. Sharon Town Forest's diverse assemblage of landforms, soils, hydrologic conditions, and natural communities suggest that additional species of conservation concern likely also depend on the property for food, shelter, water, and space – the four criteria for functional wildlife habitat.

Sharon Town Forest also hosts a high density of vernal pools, which support excellent-quality breeding sites for amphibians and invertebrates dependent on these small, ephemeral waterbodies. At the regional and national scales, Sharon Town Forest and the surrounding area has repeatedly been identified as a conservation priority by multiple studies and conservation planning efforts. The site's rich biodiversity, high degree of climate-resiliency, and strong habitat connectivity provide invaluable benefits to local flora and fauna, but also benefit Sharon's residents through such ecosystem services as air purification, carbon sequestration, groundwater filtration, floodwater retention, flower pollination, nature-based recreation, and aesthetic value. Many opportunities for future inventory and research exist, and such endeavors could further contribute to ecologically-informed, climate-smart stewardship of Sharon Town Forest for generations to come.

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APPENDIX A: BIRDS OF SHARON TOWN FOREST

Key to conservation status identifiers:

1 – Bird Conservation Region 14 assessment (Dettmers, 2006)
2 – Partners in Flight assessment (Rosenberg et al., 2016)
3 – North American Bird Conservation Initiative assessment (NABCI, 2022)
4 – New Hampshire State Wildlife Action Plan (NHFG, 2015)
5 – New Hampshire Audubon assessment (Hunt, 2020)

Common Name	Scientific Name	Conservation Status	NH Population Trend	Season Present at Sharon Town Forest
Acadian Flycatcher	*Empidonax virescens*		Accidental/Vagrant	Spring Migration
Alder Flycatcher	*Empidonax alnorum*		Strongly increasing	Spring, Summer, Fall
American Crow	*Corvus brachyrhynchos*		Increasing	Year-round
American Goldfinch	*Spinus tristis*		Stable	Year-round
American Goshawk	*Astur atricapillus*	1, 4, 5	Unknown	Year-round
American Robin	*Turdus migratorius*		Stable	Year-round
Barn Swallow	*Hirundo rustica*	1	Strongly decreasing	Spring, Summer, Fall
Barred Owl	*Strix varia*		Increasing	Year-round
Black-and-white Warbler	*Mniotilta varia*		Strongly decreasing	Spring, Summer. Fall
Blackburnian Warbler	*Setophaga fusca*	1	Stable	Spring, Summer, Fall
Black-capped Chickadee	*Poecile atricapillus*		Increasing	Year-round
Black-throated Blue Warbler	*Setophaga caerulescens*	1	Increasing	Spring, Summer, Fall
Black-throated Green Warbler	*Setophaga virens*	1	Increasing	Spring, Summer, Fall
Blue Jay	*Cyanocitta cristata*		Decreasing	Year-round
Blue-headed Vireo	*Vireo solitarius*		Increasing	Spring, Summer, Fall
Broad-winged Hawk	*Buteo platypterus*		Increasing	Spring, Summer, Fall
Brown Creeper	*Certhia americana*	1	Increasing	Year-round
Canada Goose	*Branta canadensis*		Strongly increasing	Spring/Fall Migration
Canada Warbler	*Cardellina canadensis*	1, 2, 3, 4, 5	Strongly decreasing	Spring, Summer, Fall
Cedar Waxwing	*Bombycilla cedrorum*		Stable	Spring, Summer, Fall
Chestnut-sided Warbler	*Setophaga pensylvanica*	1	Strongly decreasing	Spring, Summer, Fall
Chimney Swift	*Chaetura pelagica*	1, 2, 3, 4, 5	Strongly decreasing	Spring, Summer, Fall

Common Name	Scientific Name	Conservation Status	NH Population Trend	Season Present at Sharon Town Forest
Chipping Sparrow	*Spizella passerina*		Increasing	Spring, Summer, Fall
Common Grackle	*Quiscalus quiscula*	2	Strongly decreasing	Spring, Summer, Fall
Common Raven	*Corvus corax*		Increasing	Year-round
Common Yellowthroat	*Geothlypis trichas*		Stable	Spring, Summer, Fall
Dark-eyed Junco	*Junco hyemalis*		Strongly decreasing	Fall, Winter, Spring
Downy Woodpecker	*Dryobates pubescens*		Strongly increasing	Year-round
Eastern Phoebe	*Sayornis phoebe*		Stable	Spring, Summer, Fall
Eastern Towhee	*Pipilo erythrophthalmus*	4, 5	Strongly decreasing	Spring, Summer, Fall
Eastern Wood-Pewee	*Contopus virens*	1	Decreasing	Spring, Summer, Fall
Golden-crowned Kinglet	*Regulus satrapa*		Increasing	Year-round
Gray Catbird	*Dumetella carolinensis*		Stable	Spring, Summer, Fall
Great Blue Heron	*Ardea herodias*		Increasing	Spring, Summer, Fall
Great Crested Flycatcher	*Myiarchus crinitus*		Stable	Spring, Summer, Fall
Hairy Woodpecker	*Dryobates villosus*		Increasing	Year-round
Hermit Thrush	*Catharus guttatus*		Stable	Spring, Summer, Fall
Mallard	*Anas platyrhynchos*		Increasing	Spring, Summer, Fall
Mourning Dove	*Zenaida macroura*		Increasing	Year-round
Nashville Warbler	*Leiothlypis ruficapilla*		Strongly decreasing	Spring, Summer, Fall
Northern Flicker	*Colaptes auratus*	1	Decreasing	Spring, Summer, Fall
Northern House Wren	*Troglodytes aedon*		Decreasing	Spring, Summer, Fall
Northern Waterthrush	*Parkesia noveboracensis*		Strongly decreasing	Spring, Summer, Fall
Ovenbird	*Seiurus aurocapilla*	1	Stable	Spring, Summer, Fall
Pileated Woodpecker	*Dryocopus pileatus*		Strongly increasing	Year-round
Pine Siskin	*Spinus pinus*		Unknown	Year-round
Pine Warbler	*Setophaga pinus*		Strongly increasing	Spring, Summer, Fall
Prairie Warbler	*Setophaga discolor*	2, 3, 4, 5	Increasing	Spring, Summer, Fall
Purple Finch	*Haemorhous purpureus*	1, 4, 5	Strongly decreasing	Year-round
Red Crossbill	*Loxia curvirostra*		Unknown	Year-round

Common Name	Scientific Name	Conservation Status	NH Population Trend	Season Present at Sharon Town Forest
Red-bellied Woodpecker	*Melanerpes carolinus*		Strongly increasing	Year-round
Red-breasted Nuthatch	*Sitta canadensis*		Increasing	Year-round
Red-eyed Vireo	*Vireo olivaceus*		Increasing	Spring, Summer, Fall
Red-shouldered Hawk	*Buteo lineatus*		Increasing	Spring, Summer, Fall
Red-tailed Hawk	*Buteo jamaicensis*		Increasing	Year-round
Red-winged Blackbird	*Agelaius phoeniceus*		Decreasing	Spring, Summer, Fall
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	1	Strongly decreasing	Spring, Summer, Fall
Ruby-crowned Kinglet	*Corthylio calendula*		Decreasing	Spring/Fall Migration
Ruby-throated Hummingbird	*Archilochus colubris*		Increasing	Spring, Summer, Fall
Ruffed Grouse	*Bonasa umbellus*	1, 4, 5	Decreasing	Year-round
Scarlet Tanager	*Piranga olivacea*	4, 5	Strongly decreasing	Spring, Summer, Fall
Song Sparrow	*Melospiza melodia*		Decreasing	Spring, Summer, Fall
Spotted Sandpiper	*Actitis macularius*		Decreasing	Spring/Fall Migration
Swamp Sparrow	*Melospiza georgiana*		Stable	Spring, Summer, Fall
Tree Swallow	*Tachycineta bicolor*		Decreasing	Spring, Summer, Fall
Tufted Titmouse	*Baeolophus bicolor*		Strongly increasing	Year-round
Veery	*Catharus fuscescens*	1, 4, 5	Decreasing	Spring, Summer, Fall
White-breasted Nuthatch	*Sitta carolinensis*		Strongly increasing	Year-round
White-throated Sparrow	*Zonotrichia albicollis*		Strongly decreasing	Year-round
Wild Turkey	*Meleagris gallopavo*		Strongly increasing	Year-round
Winter Wren	*Troglodytes hiemalis*		Unknown	Spring, Summer, Fall
Wood Duck	*Aix sponsa*	1	Increasing	Spring, Summer, Fall
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1	Increasing	Spring, Summer, Fall
Yellow-billed Cuckoo	*Coccyzus americanus*	2	Decreasing	Spring, Summer, Fall
Yellow-rumped Warbler	*Setophaga coronata*		Stable	Spring, Summer, Fall

APPENDIX B: SHARON TOWN FOREST BIODIVERSITY

A total of 771 wild species were documented at Sharon Town Forest over the course of this project.

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
ARACHNIDS				
Six-spotted Orbweaver	*Araniella displicata*	Arachnida	Araneae	Araneidae
Humpbacked Orbweaver	*Eustala anastera*	Arachnida	Araneae	Araneidae
lined orbweaver	*Mangora gibberosa*	Arachnida	Araneae	Araneidae
Tuft-legged Orbweaver	*Mangora placida*	Arachnida	Araneae	Araneidae
Arabesque Orbweaver	*Neoscona arabesca*	Arachnida	Araneae	Araneidae
	Emblyna spp.	Arachnida	Araneae	Dictynidae
Dark Fishing Spider	*Dolomedes tenebrosus*	Arachnida	Araneae	Dolomedidae
Burrow-living Wolf Spiders	*Hogna spp.*	Arachnida	Araneae	Lycosidae
Thin-legged Wolf Spiders	*Pardosa spp.*	Arachnida	Araneae	Lycosidae
	Philodromus spp.	Arachnida	Araneae	Philodromidae
American Nursery Web Spider	*Pisaurina mira*	Arachnida	Araneae	Pisauridae
Bronze Jumping Spider	*Eris militaris*	Arachnida	Araneae	Salticidae
Hoy's Jumping Spider	*Evarcha hoyi*	Arachnida	Araneae	Salticidae
Brilliant Jumping Spider	*Phidippus clarus*	Arachnida	Araneae	Salticidae
Grayish Jumping Spider	*Phidippus princeps*	Arachnida	Araneae	Salticidae
Whitman's Jumping Spider	*Phidippus whitmani*	Arachnida	Araneae	Salticidae
Elongate Stilt Spider	*Tetragnatha elongata*	Arachnida	Araneae	Tetragnathidae
Versicolor Long-jawed Orbweaver	*Tetragnatha versicolor*	Arachnida	Araneae	Tetragnathidae
Ground Crab Spiders	*Xysticus spp.*	Arachnida	Araneae	Thomisidae
	Misumenini (Tribe)	Arachnida	Araneae	Thomisidae
American Dog Tick	*Dermacentor variabilis*	Arachnida	Ixodida	Ixodidae
Eastern Black-legged Tick	*Ixodes scapularis*	Arachnida	Ixodida	Ixodidae
	Leiobunum spp.	Arachnida	Opiliones	Sclerosomatidae
beech erineum mite	*Acalitus ferrugineum*	Arachnida	Sarcoptiformes	Eriophyidae
	Acalitus longisetosus	Arachnida	Sarcoptiformes	Eriophyidae
Black Tupelo Gall Mite	*Aceria nyssae*	Arachnida	Sarcoptiformes	Eriophyidae
	Aculus minutissimus	Arachnida	Sarcoptiformes	Eriophyidae
	Eriophyes betulae	Arachnida	Sarcoptiformes	Eriophyidae
Plum Finger Gall Mite	*Eriophyes emarginatae*	Arachnida	Sarcoptiformes	Eriophyidae
Alder Leaf Gall Mite	*Eriophyes laevis*	Arachnida	Sarcoptiformes	Eriophyidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
BRANCHIOPODS				
Fairy shrimp	*Eubranchipus spp.*	Branchiopoda	Anostraca	Chirocephalidae
INSECTS (BEETLES)				
Short-collared Soldier Beetle	*Podabrus brevicollis*	Insecta	Coleoptera	Cantharidae
	Rhagonycha spp.	Insecta	Coleoptera	Cantharidae
	Bembidion spp.	Insecta	Coleoptera	Carabidae
	Analeptura lineola	Insecta	Coleoptera	Cerambycidae
	Etorofus subhamatus	Insecta	Coleoptera	Cerambycidae
Sugar Maple Borer	*Glycobius speciosus*	Insecta	Coleoptera	Cerambycidae
	Judolia cordifera	Insecta	Coleoptera	Cerambycidae
White-spotted Sawyer	*Monochamus scutellatus*	Insecta	Coleoptera	Cerambycidae
Strangalepta Flower Longhorn Beetle	*Strangalepta abbreviata*	Insecta	Coleoptera	Cerambycidae
Banded Longhorn Beetle	*Typocerus velutinus*	Insecta	Coleoptera	Cerambycidae
Belly-banded Flea Beetle	*Capraita subvittata*	Insecta	Coleoptera	Chrysomelidae
	Chalepus walshii	Insecta	Coleoptera	Chrysomelidae
Maine Leaf Beetle	*Chrysomela mainensis*	Insecta	Coleoptera	Chrysomelidae
Tubercle-faced reed beetle	*Donacia tuberculifrons*	Insecta	Coleoptera	Chrysomelidae
	Microrhopala excavata	Insecta	Coleoptera	Chrysomelidae
Crowded Leaf Beetle	*Ophraella conferta*	Insecta	Coleoptera	Chrysomelidae
Metallic reed beetle	*Plateumaris metallica*	Insecta	Coleoptera	Chrysomelidae
Red Aquatic Leaf Beetle	*Plateumaris rufa*	Insecta	Coleoptera	Chrysomelidae
Shoemaker's reed beetle	*Plateumaris shoemakeri*	Insecta	Coleoptera	Chrysomelidae
	Tricholochmaea spp.	Insecta	Coleoptera	Chrysomelidae
Asian Lady Beetle	*Harmonia axyridis*	Insecta	Coleoptera	Coccinellidae
Sedge Billbug Weevil	*Sphenophorus costipennis*	Insecta	Coleoptera	Curculionidae
Red Click Beetle	*Ampedus rubricus*	Insecta	Coleoptera	Elateridae
	Limonius spp.	Insecta	Coleoptera	Elateridae
	Geotrupes spp.	Insecta	Coleoptera	Geotrupidae
	Gyrininae (Subfamily)	Insecta	Coleoptera	Gyrinidae
Black Firefly	*Lucidota atra*	Insecta	Coleoptera	Lampyridae
	Photinus spp.	Insecta	Coleoptera	Lampyridae
	Photuris spp.	Insecta	Coleoptera	Lampyridae
Terminal Net-winged Beetle	*Caenia dimidiata*	Insecta	Coleoptera	Lycidae
Reticulated Net-winged Beetle	*Calopteron reticulatum*	Insecta	Coleoptera	Lycidae
	Plateros spp.	Insecta	Coleoptera	Lycidae
Tumbling Ragdoll	*Mordella marginata*	Insecta	Coleoptera	Mordellidae
Oriental Beetle	*Exomala orientalis*	Insecta	Coleoptera	Scarabaeidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Japanese Beetle	*Popillia japonica*	Insecta	Coleoptera	Scarabaeidae
Marsh Beetles	*Scirtidae (Family)*	Insecta	Coleoptera	Scirtidae
False Flower Beetles	*Scraptiidae (Family)*	Insecta	Coleoptera	Scraptiidae
	Philonthus spp.	Insecta	Coleoptera	Staphylinidae
	Sepedophilus spp.	Insecta	Coleoptera	Staphylinidae
	Capnochroa spp.	Insecta	Coleoptera	Tenebrionidae
Spurred Darkling Beetle	*Centronopus calcaratus*	Insecta	Coleoptera	Tenebrionidae
	Isomira spp.	Insecta	Coleoptera	Tenebrionidae
INSECTS (FLIES)				
	Agromyza idaeiana	Insecta	Diptera	Agromyzidae
	Agromyza vockerothi	Insecta	Diptera	Agromyzidae
	Calycomyza flavinotum	Insecta	Diptera	Agromyzidae
	Cerodontha spp.	Insecta	Diptera	Agromyzidae
Milkweed Leaf-miner Fly	*Liriomyza asclepiadis*	Insecta	Diptera	Agromyzidae
	Liriomyza limopsis	Insecta	Diptera	Agromyzidae
	Liriomyza smilacinae	Insecta	Diptera	Agromyzidae
Jewelweed Leaf-miner Fly	*Phytoliriomyza melampyga*	Insecta	Diptera	Agromyzidae
	Phytomyza agromyzina	Insecta	Diptera	Agromyzidae
	Phytomyza aralivora	Insecta	Diptera	Agromyzidae
	Phytomyza plumiseta	Insecta	Diptera	Agromyzidae
	Phytomyza tarnwoodensis	Insecta	Diptera	Agromyzidae
	Chirosia filicis	Insecta	Diptera	Anthomyiidae
Eastern Yellow-backed Laphria	*Laphria thoracica*	Insecta	Diptera	Asilidae
	Laphria seicea (complex)	Insecta	Diptera	Asilidae
	Laphria canis (complex).	Insecta	Diptera	Asilidae
Black-thighed Bladetail	*Machimus notatus*	Insecta	Diptera	Asilidae
Yellow-thighed Bentbristle	*Neoitamus flavofemoratus*	Insecta	Diptera	Asilidae
	Leptogastrini (Tribe)	Insecta	Diptera	Asilidae
	Villa spp.	Insecta	Diptera	Bombyliidae
Blow Flies	*Calliphoridae (Family)*	Insecta	Diptera	Calliphoridae
Ocellate Gall Midge	*Acericecis ocellaris*	Insecta	Diptera	Cecidomyiidae
Euthamia leaf gall midge	*Asteromyia euthamiae*	Insecta	Diptera	Cecidomyiidae
	Dasineura salicifoliae	Insecta	Diptera	Cecidomyiidae
	Macrodiplosis majalis	Insecta	Diptera	Cecidomyiidae
	Macrodiplosis niveipila	Insecta	Diptera	Cecidomyiidae
Rust-eating midges	*Mycodiplosis spp.*	Insecta	Diptera	Cecidomyiidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
	Rhopalomyia hirtipes	Insecta	Diptera	Cecidomyiidae
	Chlorops spp.	Insecta	Diptera	Chloropidae
	Aedes spp.	Insecta	Diptera	Culicidae
	Condylostylus patibulatus	Insecta	Diptera	Dolichopodidae
	Dolichopus spp.	Insecta	Diptera	Dolichopodidae
	Tachytrechus spp.	Insecta	Diptera	Dolichopodidae
	Elephantomyia westwoodi	Insecta	Diptera	Limoniidae
	Molophilus spp.	Insecta	Diptera	Limoniidae
	Eudasyphora cyanicolor	Insecta	Diptera	Muscidae
Cereal Fly	*Geomyza tripunctata*	Insecta	Diptera	Opomyzidae
Eastern Phantom Crane Fly	*Bittacomorpha clavipes*	Insecta	Diptera	Ptychopteridae
Common Snipe Fly	*Rhagio mystaceus*	Insecta	Diptera	Rhagionidae
Lesser Variegated Snipe Fly	*Rhagio punctipennis*	Insecta	Diptera	Rhagionidae
Flesh Flies and Satellite Flies	*Sarcophagidae (Family)*	Insecta	Diptera	Sarcophagidae
	Leptopa vittata	Insecta	Diptera	Scathophagidae
Golden Dung Fly	*Scathophaga stercoraria*	Insecta	Diptera	Scathophagidae
	Phytosciara greylockensis	Insecta	Diptera	Sciaridae
	Tetanocera spp.	Insecta	Diptera	Sciomyzidae
	Sepsis spp.	Insecta	Diptera	Sepsidae
Orange-tailed Wood Fly	*Blera analis*	Insecta	Diptera	Syrphidae
Bog-dwelling Drone Fly	*Eristalis cryptarum*	Insecta	Diptera	Syrphidae
Aphideaters	*Eupeodes spp.*	Insecta	Diptera	Syrphidae
Banded Thintail	*Meliscaeva cinctella*	Insecta	Diptera	Syrphidae
Sedgesitters	*Platycheirus spp.*	Insecta	Diptera	Syrphidae
Fourspot Sedgesitter	*Pyrophaena rosarum*	Insecta	Diptera	Syrphidae
Globetails	*Sphaerophoria spp.*	Insecta	Diptera	Syrphidae
Eastern Calligrapher	*Toxomerus geminatus*	Insecta	Diptera	Syrphidae
Margined Calligrapher	*Toxomerus marginatus*	Insecta	Diptera	Syrphidae
Charcoal Deer Fly	*Chrysops carbonarius*	Insecta	Diptera	Tabanidae
Gemeni Deer Fly	*Chrysops geminatus*	Insecta	Diptera	Tabanidae
Macquart's Deer Fly	*Chrysops macquarti*	Insecta	Diptera	Tabanidae
Sacken's Deer Fly	*Chrysops sackeni*	Insecta	Diptera	Tabanidae
One-striped Deer Fly	*Chrysops univittatus*	Insecta	Diptera	Tabanidae
	Hybomitra cincta	Insecta	Diptera	Tabanidae
	Stonemyia spp.	Insecta	Diptera	Tabanidae
True Horse Flies	*Tabanus spp.*	Insecta	Diptera	Tabanidae
Early Tachinid Fly	*Epalpus signifer*	Insecta	Diptera	Tachinidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Winsome Fly	*Istocheta aldrichi*	Insecta	Diptera	Tachinidae
	Tipula spp.	Insecta	Diptera	Tipulidae
INSECTS (TRUE BUGS)				
Pineapple-gall Adelgid	*Adelges abietis*	Insecta	Hemiptera	Adelgidae
Hemlock Woolly Adelgid	*Adelges tsugae*	Insecta	Hemiptera	Adelgidae
Pine Bark Adelgid	*Pineus strobi*	Insecta	Hemiptera	Adelgidae
	Trialeurodes pergandei	Insecta	Hemiptera	Aleyrodidae
	Chaitophorus spp.	Insecta	Hemiptera	Aphididae
Birch Aphids	*Euceraphis spp.*	Insecta	Hemiptera	Aphididae
Large Daisy Aphids	*Uroleucon spp.*	Insecta	Hemiptera	Aphididae
	Lepyronia coleoptrata	Insecta	Hemiptera	Aphrophoridae
Meadow Spittlebug	*Philaenus spumarius*	Insecta	Hemiptera	Aphrophoridae
	Agallia spp.	Insecta	Hemiptera	Cicadellidae
	Amphigonalia gothica	Insecta	Hemiptera	Cicadellidae
	Draeculacephala spp.	Insecta	Hemiptera	Cicadellidae
Rhododendron Leafhopper	*Graphocephala fennahi*	Insecta	Hemiptera	Cicadellidae
	Idiodonus kennicotti	Insecta	Hemiptera	Cicadellidae
	Oncopsis spp.	Insecta	Hemiptera	Cicadellidae
	Plesiommata tripunctata	Insecta	Hemiptera	Cicadellidae
	Cixius spp.	Insecta	Hemiptera	Cixiidae
	Melanoliarus spp.	Insecta	Hemiptera	Cixiidae
	Merocoris distinctus	Insecta	Hemiptera	Coreidae
	Cedusa spp.	Insecta	Hemiptera	Derbidae
Beech Scale	*Cryptococcus fagisuga*	Insecta	Hemiptera	Eriococcidae
North American Common Water Strider	*Aquarius remigis*	Insecta	Hemiptera	Gerridae
	Gerris spp.	Insecta	Hemiptera	Gerridae
Kayak Pond Skater	*Limnoporus dissortis*	Insecta	Hemiptera	Gerridae
	Telamona spp.	Insecta	Hemiptera	Membracidae
	Ochterus banksi	Insecta	Hemiptera	Ochteridae
	Phlegyas abbreviatus	Insecta	Hemiptera	Pachygronthidae
Green Stink Bug	*Chinavia hilaris*	Insecta	Hemiptera	Pentatomidae
Brown Stink Bugs	*Euschistus spp.*	Insecta	Hemiptera	Pentatomidae
	Fitchia aptera	Insecta	Hemiptera	Reduviidae
	Galgupha spp.	Insecta	Hemiptera	Thyreocoridae
INSECTS (ANTS, BEES, WASPS, AND SAWFLIES)				
Mining Bees	*Andrena spp.*	Insecta	Hymenoptera	Andrenidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Western Honey Bee	*Apis mellifera*	Insecta	Hymenoptera	Apidae
Two-spotted Bumble Bee	*Bombus bimaculatus*	Insecta	Hymenoptera	Apidae
Yellowish Cuckoo Bumble bee	*Bombus flavidus*	Insecta	Hymenoptera	Apidae
Brown-belted Bumble Bee	*Bombus griseocollis*	Insecta	Hymenoptera	Apidae
Common Eastern Bumble Bee	*Bombus impatiens*	Insecta	Hymenoptera	Apidae
Perplexing Bumble Bee	*Bombus perplexus*	Insecta	Hymenoptera	Apidae
	Hedychrum spp.	Insecta	Hymenoptera	Chrysididae
Modest Masked Bee	*Hylaeus modestus*	Insecta	Hymenoptera	Colletidae
Typical Weevil Wasps and Allies	*Cerceris spp.*	Insecta	Hymenoptera	Crabronidae
Larger Empty Oak Apple Wasp	*Amphibolips quercusinanis*	Insecta	Hymenoptera	Cynipidae
Introduced Pine Sawfly	*Diprion similis*	Insecta	Hymenoptera	Diprionidae
New York Carpenter Ant	*Camponotus novaeboracensis*	Insecta	Hymenoptera	Formicidae
Eastern Black Carpenter Ant	*Camponotus pennsylvanicus*	Insecta	Hymenoptera	Formicidae
Wood, Mound, and Field Ants	*Formica spp.*	Insecta	Hymenoptera	Formicidae
Citronella Ants, Fuzzy Ants, and Allies	*Lasius spp.*	Insecta	Hymenoptera	Formicidae
Golden Sweat Bee	*Augochlorella aurata*	Insecta	Hymenoptera	Halictidae
	Anomalon spp.	Insecta	Hymenoptera	Ichneumonidae
	Cratichneumon spp.	Insecta	Hymenoptera	Ichneumonidae
Blueberry Stem Gall Wasp	*Hemadas nubilipennis*	Insecta	Hymenoptera	Ormyridae
	Priocnemis minorata	Insecta	Hymenoptera	Pompilidae
	Dimorphopteryx spp.	Insecta	Hymenoptera	Tenthredinidae
Violet Leafmining Sawfly	*Nefusa ambigua*	Insecta	Hymenoptera	Tenthredinidae
Amber-marked Birch Leaf-miner Sawfly	*Profenusa thomsoni*	Insecta	Hymenoptera	Tenthredinidae
	Strongylogaster spp.	Insecta	Hymenoptera	Tenthredinidae
	Tenthredo spp.	Insecta	Hymenoptera	Tenthredinidae
Parasitic Aerial Yellowjacket	*Dolichovespula arctica*	Insecta	Hymenoptera	Vespidae
Common Aerial Yellowjacket	*Dolichovespula arenaria*	Insecta	Hymenoptera	Vespidae
INSECTS (BUTTERFLIES AND MOTHS)				
Ridings' Fairy Moth	*Adela ridingsella*	Insecta	Lepidoptera	Adelidae
Ribbed Cocoon-Making Moths	*Bucculatricidae (Family)*	Insecta	Lepidoptera	Bucculatricidae
Casebearers	*Coleophora spp.*	Insecta	Lepidoptera	Coleophoridae
Yellow-spotted Webworm Moth	*Anageshna primordialis*	Insecta	Lepidoptera	Crambidae
White-spotted Sable	*Anania funebris*	Insecta	Lepidoptera	Crambidae
Small White Grass-veneer	*Crambus albellus*	Insecta	Lepidoptera	Crambidae
Pasture Grass-veneer	*Crambus saltuellus*	Insecta	Lepidoptera	Crambidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
	Donacaula spp.	Insecta	Lepidoptera	Crambidae
Pondside Crambid Moth	*Elophila icciusalis*	Insecta	Lepidoptera	Crambidae
Diminutive Grass-veneer	*Raphiptera argillaceellus*	Insecta	Lepidoptera	Crambidae
Double-striped Scoparia Moth	*Scoparia biplagialis*	Insecta	Lepidoptera	Crambidae
Dark Brown Scoparia Moth	*Scoparia penumbralis*	Insecta	Lepidoptera	Crambidae
Snowy Urola Moth	*Urola nivalis*	Insecta	Lepidoptera	Crambidae
Schlaeger's Fruitworm Moth	*Antaeotricha schlaegeri*	Insecta	Lepidoptera	Depressariidae
Morbid Owlet	*Chytolita morbidalis*	Insecta	Lepidoptera	Erebidae
Yellow-collared Scape Moth	*Cisseps fulvicollis*	Insecta	Lepidoptera	Erebidae
Milkweed Tussock Moth	*Euchaetes egle*	Insecta	Lepidoptera	Erebidae
	Halysidota spp.	Insecta	Lepidoptera	Erebidae
Orange-spotted Idia Moth	*Idia diminuendis*	Insecta	Lepidoptera	Erebidae
Slant-lined Owlet	*Macrochilo absorptalis*	Insecta	Lepidoptera	Erebidae
Brown-lined Owlet	*Macrochilo litophora*	Insecta	Lepidoptera	Erebidae
Maple Looper Moth	*Parallelia bistriaris*	Insecta	Lepidoptera	Erebidae
Pale Phalaenostola Moth	*Phalaenostola metonalis*	Insecta	Lepidoptera	Erebidae
Yellow-spotted Renia Moth	*Renia flavipunctalis*	Insecta	Lepidoptera	Erebidae
Sober Renia Moth	*Renia sobrialis*	Insecta	Lepidoptera	Erebidae
Spotted Grass Moth	*Rivula propinqualis*	Insecta	Lepidoptera	Erebidae
Virginian Tiger Moth	*Spilosoma virginica*	Insecta	Lepidoptera	Erebidae
Zale Moths	*Zale spp.*	Insecta	Lepidoptera	Erebidae
Variable Fan-foot	*Zanclognatha laevigata*	Insecta	Lepidoptera	Erebidae
Lettered Fan-foot	*Zanclognatha lituralis*	Insecta	Lepidoptera	Erebidae
	Aristotelia spp.	Insecta	Lepidoptera	Gelechiidae
Cream-edged Dichomeris Moth	*Dichomeris flavocostella*	Insecta	Lepidoptera	Gelechiidae
Goldenrod Elliptical-Gall Moth	*Gnorimoschema gallaesolidaginis*	Insecta	Lepidoptera	Gelechiidae
	Cabera spp.	Insecta	Lepidoptera	Geometridae
Powder Moth	*Eufidonia notataria*	Insecta	Lepidoptera	Geometridae
Confused Eusarca Moth	*Eusarca confusaria*	Insecta	Lepidoptera	Geometridae
Red-headed Inchworm Moth	*Macaria bisignata*	Insecta	Lepidoptera	Geometridae
Lesser Maple Spanworm Moth	*Macaria pustularia*	Insecta	Lepidoptera	Geometridae
Northern Petrophora Moth	*Petrophora subaequaria*	Insecta	Lepidoptera	Geometridae
	Probole spp.	Insecta	Lepidoptera	Geometridae
Large Lace-border Moth	*Scopula limboundata*	Insecta	Lepidoptera	Geometridae
Crocus Geometer Moths	*Xanthotype spp.*	Insecta	Lepidoptera	Geometridae
White Pine Barkminer Moth	*Marmara fasciella*	Insecta	Lepidoptera	Gracillariidae
	Parornix spp.	Insecta	Lepidoptera	Gracillariidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Aspen Serpentine Leafminer Moth	*Phyllocnistis populiella*	Insecta	Lepidoptera	Gracillariidae
	Antispila freemani	Insecta	Lepidoptera	Heliozelidae
Pepper and Salt Skipper	*Amblyscirtes hegon*	Insecta	Lepidoptera	Hesperiidae
Delaware Skipper	*Anatrytone logan*	Insecta	Lepidoptera	Hesperiidae
Least Skipper	*Ancyloxypha numitor*	Insecta	Lepidoptera	Hesperiidae
Arctic Skipper	*Carterocephalus mandan*	Insecta	Lepidoptera	Hesperiidae
Duskywings	*Erynnis spp.*	Insecta	Lepidoptera	Hesperiidae
Two-spotted Skipper	*Euphyes bimacula*	Insecta	Lepidoptera	Hesperiidae
Black Dash	*Euphyes conspicua*	Insecta	Lepidoptera	Hesperiidae
Dun Skipper	*Euphyes vestris*	Insecta	Lepidoptera	Hesperiidae
Indian Skipper	*Hesperia sassacus*	Insecta	Lepidoptera	Hesperiidae
Hobomok Skipper	*Lon hobomok*	Insecta	Lepidoptera	Hesperiidae
Mulberry Wing	*Poanes massasoit*	Insecta	Lepidoptera	Hesperiidae
Long Dash	*Polites mystic*	Insecta	Lepidoptera	Hesperiidae
European Skipper	*Thymelicus lineola*	Insecta	Lepidoptera	Hesperiidae
Little Glassywing	*Vernia verna*	Insecta	Lepidoptera	Hesperiidae
Henry's Elfin	*Callophrys henrici*	Insecta	Lepidoptera	Lycaenidae
Holarctic Azures	*Celastrina spp.*	Insecta	Lepidoptera	Lycaenidae
Goldcap Moss-Eater	*Epimartyria auricrinella*	Insecta	Lepidoptera	Micropterigidae
	Stigmella prunifoliella	Insecta	Lepidoptera	Nepticulidae
	Stigmella quercipulchella	Insecta	Lepidoptera	Nepticulidae
Curved Halter Moth	*Capis curvata*	Insecta	Lepidoptera	Noctuidae
Brown-hooded Owlet	*Cucullia convexipennis*	Insecta	Lepidoptera	Noctuidae
Bog Glyph	*Deltote bellicula*	Insecta	Lepidoptera	Noctuidae
Bilobed Looper Moth	*Megalographa biloba*	Insecta	Lepidoptera	Noctuidae
Sigmoid Prominent	*Clostera albosigma*	Insecta	Lepidoptera	Notodontidae
Unicorn Prominent	*Coelodasys unicornis*	Insecta	Lepidoptera	Notodontidae
Great Spangled Fritillary	*Argynnis cybele*	Insecta	Lepidoptera	Nymphalidae
Silver-bordered Fritillary	*Boloria myrina*	Insecta	Lepidoptera	Nymphalidae
Common Wood-Nymph	*Cercyonis pegala*	Insecta	Lepidoptera	Nymphalidae
Harris's Checkerspot	*Chlosyne harrisii*	Insecta	Lepidoptera	Nymphalidae
Common Ringlet	*Coenonympha california*	Insecta	Lepidoptera	Nymphalidae
Northern Pearly-eye	*Lethe anthedon*	Insecta	Lepidoptera	Nymphalidae
Appalachian Brown	*Lethe appalachia*	Insecta	Lepidoptera	Nymphalidae
Eyed Brown	*Lethe eurydice*	Insecta	Lepidoptera	Nymphalidae
Red-spotted Admiral	*Limenitis arthemis*	Insecta	Lepidoptera	Nymphalidae
Little Wood Satyr	*Megisto cymela*	Insecta	Lepidoptera	Nymphalidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Crescents	*Phyciodes spp.*	Insecta	Lepidoptera	Nymphalidae
Red Admiral	*Vanessa atalanta*	Insecta	Lepidoptera	Nymphalidae
Three-spotted Concealer	*Eido trimaculella*	Insecta	Lepidoptera	Oecophoridae
Newman's Mathildana Moth	*Mathildana newmanella*	Insecta	Lepidoptera	Oecophoridae
Canadian Tiger Swallowtail	*Papilio canadensis*	Insecta	Lepidoptera	Papilionidae
Common Bagworm Moth	*Psyche casta*	Insecta	Lepidoptera	Psychidae
Himmelman's and Busck's Plume Moths	*Geina spp.*	Insecta	Lepidoptera	Pterophoridae
Polyphemus Moth	*Antheraea polyphemus*	Insecta	Lepidoptera	Saturniidae
Rosy Maple Moth	*Dryocampa rubicunda*	Insecta	Lepidoptera	Saturniidae
Waved Sphinx	*Ceratomia undulosa*	Insecta	Lepidoptera	Sphingidae
Northern Pine Sphinx	*Lapara bombycoides*	Insecta	Lepidoptera	Sphingidae
Apple Sphinxes	*Sphinx spp.*	Insecta	Lepidoptera	Sphingidae
Greenish Apple Moth	*Clepsis virescana*	Insecta	Lepidoptera	Tortricidae
White Pine Coneborer Moth	*Eucopina tocullionana*	Insecta	Lepidoptera	Tortricidae
	Eucosma spp.	Insecta	Lepidoptera	Tortricidae
Divided Olethreutes Moth	*Olethreutes bipartitana*	Insecta	Lepidoptera	Tortricidae
	Olethreutes coruscana	Insecta	Lepidoptera	Tortricidae
Raspberry Leafroller Moth	*Olethreutes permundana*	Insecta	Lepidoptera	Tortricidae
Dusky Leafroller Moth	*Orthotaenia undulana*	Insecta	Lepidoptera	Tortricidae
Bare-patched Leafroller Moth	*Pseudexentera spoliana*	Insecta	Lepidoptera	Tortricidae
	Sparganothis violaceana	Insecta	Lepidoptera	Tortricidae
Mosaic Sparganothis Moth	*Sparganothis xanthoides*	Insecta	Lepidoptera	Tortricidae
INSECTS (SCORPIONFLIES, HANGINGFLIES, AND ALLIES)				
	Panorpa spp.	Insecta	Mecoptera	Panorpidae
INSECTS (ALDERFLIES, DOBSONFLIES, AND FISHFLIES)				
Serrate Dark Fishfly	*Nigronia serricornis*	Insecta	Megaloptera	Corydalidae
INSECTS (DRAGONFLIES AND DAMSELFLIES)				
Canada Darner	*Aeshna canadensis*	Insecta	Odonata	Aeshnidae
Black-tipped Darner	*Aeshna tuberculifera*	Insecta	Odonata	Aeshnidae
Common Green Darner	*Anax junius*	Insecta	Odonata	Aeshnidae
River Jewelwing	*Calopteryx aequabilis*	Insecta	Odonata	Calopterygidae
Superb Jewelwing	*Calopteryx amata*	Insecta	Odonata	Calopterygidae
Ebony Jewelwing	*Calopteryx maculata*	Insecta	Odonata	Calopterygidae
Eastern Red Damsel	*Amphiagrion saucium*	Insecta	Odonata	Coenagrionidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Violet Dancer	*Argia fumipennis*	Insecta	Odonata	Coenagrionidae
Variable Dancer	*Argia fumipennis*	Insecta	Odonata	Coenagrionidae
Aurora Damsel	*Chromagrion conditum*	Insecta	Odonata	Coenagrionidae
Bluets	*Enallagma spp.*	Insecta	Odonata	Coenagrionidae
Fragile Forktail	*Ischnura posita*	Insecta	Odonata	Coenagrionidae
Eastern Forktail	*Ischnura verticalis*	Insecta	Odonata	Coenagrionidae
Sphagnum Sprite	*Nehalennia gracilis*	Insecta	Odonata	Coenagrionidae
Sedge Sprite	*Nehalennia irene*	Insecta	Odonata	Coenagrionidae
Delta-spotted Spiketail	*Zoraena diastatops*	Insecta	Odonata	Cordulegastridae
Twin-spotted Spiketail	*Zoraena maculata*	Insecta	Odonata	Cordulegastridae
Racket-tailed Emerald	*Dorocordulia libera*	Insecta	Odonata	Corduliidae
Common Baskettail	*Epitheca cynosura*	Insecta	Odonata	Corduliidae
Prince Baskettail	*Epitheca princeps*	Insecta	Odonata	Corduliidae
Dragonhunter	*Hagenius brevistylus*	Insecta	Odonata	Gomphidae
Mustached Clubtail	*Hylogomphus adelphus*	Insecta	Odonata	Gomphidae
Southern Pygmy Clubtail	*Lanthus vernalis*	Insecta	Odonata	Gomphidae
Beaverpond Clubtail	*Phanogomphus borealis*	Insecta	Odonata	Gomphidae
Harpoon Clubtail	*Phanogomphus descriptus*	Insecta	Odonata	Gomphidae
Lancet Clubtail	*Phanogomphus exilis*	Insecta	Odonata	Gomphidae
Eastern Least Clubtail	*Stylogomphus albistylus*	Insecta	Odonata	Gomphidae
Calico Pennant	*Celithemis elisa*	Insecta	Odonata	Libellulidae
Halloween Pennant	*Celithemis eponina*	Insecta	Odonata	Libellulidae
Eastern Pondhawk	*Erythemis simplicicollis*	Insecta	Odonata	Libellulidae
Chalk-fronted Corporal	*Ladona julia*	Insecta	Odonata	Libellulidae
Hudsonian Whiteface	*Leucorrhinia hudsonica*	Insecta	Odonata	Libellulidae
Dot-tailed Whiteface	*Leucorrhinia intacta*	Insecta	Odonata	Libellulidae
Spangled Skimmer	*Libellula cyanea*	Insecta	Odonata	Libellulidae
Slaty Skimmer	*Libellula incesta*	Insecta	Odonata	Libellulidae
Widow Skimmer	*Libellula luctuosa*	Insecta	Odonata	Libellulidae
Twelve-spotted Skimmer	*Libellula pulchella*	Insecta	Odonata	Libellulidae
Four-spotted Skimmer	*Libellula quadrimaculata*	Insecta	Odonata	Libellulidae
Elfin Skimmer	*Nannothemis bella*	Insecta	Odonata	Libellulidae
Blue Dasher	*Pachydiplax longipennis*	Insecta	Odonata	Libellulidae
Common Whitetail	*Plathemis lydia*	Insecta	Odonata	Libellulidae
Meadowhawks	*Sympetrum spp.*	Insecta	Odonata	Libellulidae
Two-striped Grasshopper	*Melanoplus bivittatus*	Insecta	Orthoptera	Acrididae
Scudder's Bush Katydids	*Scudderia spp.*	Insecta	Orthoptera	Tettigoniidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
INSECTS (STONEFLIES)				
	Alloperla spp.	Insecta	Plecoptera	Chloroperlidae
Rolled-winged Stoneflies	*Leuctridae (Family)*	Insecta	Plecoptera	Leuctridae
Forestflies	*Nemouridae (Family)*	Insecta	Plecoptera	Nemouridae
INSECTS (BARKLICE, BOOKLICE, AND PARASITIC LICE)				
Barklice, Booklice, and Parasitic Lice	*Psocodea (Order)*	Insecta	Psocodea	[unidentified]
INSECTS (CADDISFLIES)				
Net-spinning Caddisflies	*Hydropsychidae (Family)*	Insecta	Trichoptera	Hydropsychidae
Giant Casemaker Caddisflies	*Phryganeidae (Family)*	Insecta	Trichoptera	Phryganeidae
	Rhyacophila spp.	Insecta	Trichoptera	Rhyacophilidae
AMPHIBIANS				
Spring Peeper	*Pseudacris crucifer*	Amphibia	Anura	Hylidae
American Bullfrog	*Lithobates catesbeianus*	Amphibia	Anura	Ranidae
Green Frog	*Lithobates clamitans*	Amphibia	Anura	Ranidae
Wood Frog	*Lithobates sylvaticus*	Amphibia	Anura	Ranidae
Spotted Salamander	*Ambystoma maculatum*	Amphibia	Caudata	Ambystomatidae
Eastern Newt	*Notophthalmus viridescens*	Amphibia	Caudata	Salamandridae
BIRDS				
American Goshawk	*Accipiter atricapillus*	Aves	Accipitriformes	Accipitridae
Red-tailed Hawk	*Buteo jamaicensis*	Aves	Accipitriformes	Accipitridae
Red-shouldered Hawk	*Buteo lineatus*	Aves	Accipitriformes	Accipitridae
Broad-winged Hawk	*Buteo platypterus*	Aves	Accipitriformes	Accipitridae
Wood Duck	*Aix sponsa*	Aves	Anseriformes	Anatidae
Mallard	*Anas platyrhynchos*	Aves	Anseriformes	Anatidae
Canada Goose	*Branta canadensis*	Aves	Anseriformes	Anatidae
Chimney Swift	*Chaetura pelagica*	Aves	Caprimulgiformes	Apodidae
Ruby-throated Hummingbird	*Archilochus colubris*	Aves	Caprimulgiformes	Trochilidae
Spotted Sandpiper	*Actitis macularius*	Aves	Charadriiformes	Scolopacidae
Mourning Dove	*Zenaida macroura*	Aves	Columbiformes	Columbidae
Yellow-billed Cuckoo	*Coccyzus americanus*	Aves	Cuculiformes	Cuculidae
Ruffed Grouse	*Bonasa umbellus*	Aves	Galliformes	Phasianidae

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Wild Turkey	*Meleagris gallopavo*	Aves	Galliformes	Phasianidae
Cedar Waxwing	*Bombycilla cedrorum*	Aves	Passeriformes	Bombycillidae
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Aves	Passeriformes	Cardinalidae
Scarlet Tanager	*Piranga olivacea*	Aves	Passeriformes	Cardinalidae
Brown Creeper	*Certhia americana*	Aves	Passeriformes	Certhiidae
American Crow	*Corvus brachyrhynchos*	Aves	Passeriformes	Corvidae
Common Raven	*Corvus corax*	Aves	Passeriformes	Corvidae
Blue Jay	*Cyanocitta cristata*	Aves	Passeriformes	Corvidae
Purple Finch	*Haemorhous purpureus*	Aves	Passeriformes	Fringillidae
Red Crossbill	*Loxia curvirostra*	Aves	Passeriformes	Fringillidae
Pine Siskin	*Spinus pinus*	Aves	Passeriformes	Fringillidae
American Goldfinch	*Spinus tristis*	Aves	Passeriformes	Fringillidae
Barn Swallow	*Hirundo rustica*	Aves	Passeriformes	Hirundinidae
Tree Swallow	*Tachycineta bicolor*	Aves	Passeriformes	Hirundinidae
Red-winged Blackbird	*Agelaius phoeniceus*	Aves	Passeriformes	Icteridae
Common Grackle	*Quiscalus quiscula*	Aves	Passeriformes	Icteridae
Gray Catbird	*Dumetella carolinensis*	Aves	Passeriformes	Mimidae
Tufted Titmouse	*Baeolophus bicolor*	Aves	Passeriformes	Paridae
Black-capped Chickadee	*Poecile atricapillus*	Aves	Passeriformes	Paridae
Canada Warbler	*Cardellina canadensis*	Aves	Passeriformes	Parulidae
Common Yellowthroat	*Geothlypis trichas*	Aves	Passeriformes	Parulidae
Nashville Warbler	*Leiothlypis ruficapilla*	Aves	Passeriformes	Parulidae
Black-and-white Warbler	*Mniotilta varia*	Aves	Passeriformes	Parulidae
Northern Waterthrush	*Parkesia noveboracensis*	Aves	Passeriformes	Parulidae
Ovenbird	*Seiurus aurocapilla*	Aves	Passeriformes	Parulidae
Black-throated Blue Warbler	*Setophaga caerulescens*	Aves	Passeriformes	Parulidae
Yellow-rumped Warbler	*Setophaga coronata*	Aves	Passeriformes	Parulidae
Prairie Warbler	*Setophaga discolor*	Aves	Passeriformes	Parulidae
Blackburnian Warbler	*Setophaga fusca*	Aves	Passeriformes	Parulidae
Chestnut-sided Warbler	*Setophaga pensylvanica*	Aves	Passeriformes	Parulidae
Pine Warbler	*Setophaga pinus*	Aves	Passeriformes	Parulidae
Black-throated Green Warbler	*Setophaga virens*	Aves	Passeriformes	Parulidae
Dark-eyed Junco	*Junco hyemalis*	Aves	Passeriformes	Passerellidae
Swamp Sparrow	*Melospiza georgiana*	Aves	Passeriformes	Passerellidae
Song Sparrow	*Melospiza melodia*	Aves	Passeriformes	Passerellidae
Eastern Towhee	*Pipilo erythrophthalmus*	Aves	Passeriformes	Passerellidae
Chipping Sparrow	*Spizella passerina*	Aves	Passeriformes	Passerellidae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
White-throated Sparrow	*Zonotrichia albicollis*	Aves	Passeriformes	Passerellidae
White-throated Sparrow	*Zonotrichia albicollis*	Aves	Passeriformes	Passerellidae
Ruby-crowned Kinglet	*Corthylio calendula*	Aves	Passeriformes	Regulidae
Golden-crowned Kinglet	*Regulus satrapa*	Aves	Passeriformes	Regulidae
Red-breasted Nuthatch	*Sitta canadensis*	Aves	Passeriformes	Sittidae
White-breasted Nuthatch	*Sitta carolinensis*	Aves	Passeriformes	Sittidae
Northern House Wren	*Troglodytes aedon*	Aves	Passeriformes	Troglodytidae
Winter Wren	*Troglodytes hiemalis*	Aves	Passeriformes	Troglodytidae
Veery	*Catharus fuscescens*	Aves	Passeriformes	Turdidae
Hermit Thrush	*Catharus guttatus*	Aves	Passeriformes	Turdidae
American Robin	*Turdus migratorius*	Aves	Passeriformes	Turdidae
Eastern Wood-Pewee	*Contopus virens*	Aves	Passeriformes	Tyrannidae
Alder Flycatcher	*Empidonax alnorum*	Aves	Passeriformes	Tyrannidae
Acadian Flycatcher	*Empidonax virescens*	Aves	Passeriformes	Tyrannidae
Great Crested Flycatcher	*Myiarchus crinitus*	Aves	Passeriformes	Tyrannidae
Eastern Phoebe	*Sayornis phoebe*	Aves	Passeriformes	Tyrannidae
Red-eyed Vireo	*Vireo olivaceus*	Aves	Passeriformes	Vireonidae
Blue-headed Vireo	*Vireo solitarius*	Aves	Passeriformes	Vireonidae
Great Blue Heron	*Ardea herodias*	Aves	Pelecaniformes	Ardeidae
Northern Flicker	*Colaptes auratus*	Aves	Piciformes	Picidae
Downy Woodpecker	*Dryobates pubescens*	Aves	Piciformes	Picidae
Hairy Woodpecker	*Dryobates villosus*	Aves	Piciformes	Picidae
Pileated Woodpecker	*Dryocopus pileatus*	Aves	Piciformes	Picidae
Red-bellied Woodpecker	*Melanerpes carolinus*	Aves	Piciformes	Picidae
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Aves	Piciformes	Picidae
Barred Owl	*Strix varia*	Aves	Strigiformes	Strigidae
MAMMALS				
Moose	*Alces alces*	Mammalia	Artiodactyla	Cervidae
White-tailed Deer	*Odocoileus virginianus*	Mammalia	Artiodactyla	Cervidae
Coyote	*Canis latrans*	Mammalia	Carnivora	Canidae
Gray Fox	*Urocyon cinereoargenteus*	Mammalia	Carnivora	Canidae
Red Fox	*Vulpes vulpes*	Mammalia	Carnivora	Canidae
Bobcat	*Lynx rufus*	Mammalia	Carnivora	Felidae
North American River Otter	*Lontra canadensis*	Mammalia	Carnivora	Mustelidae
Long-tailed Weasel	*Neogale frenata*	Mammalia	Carnivora	Mustelidae
Fisher	*Pekania pennanti*	Mammalia	Carnivora	Mustelidae

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Common Raccoon	*Procyon lotor*	Mammalia	Carnivora	Procyonidae
American Black Bear	*Ursus americanus*	Mammalia	Carnivora	Ursidae
Virginia Opossum	*Didelphis virginiana*	Mammalia	Didelphimorphia	Didelphidae
American Beaver	*Castor canadensis*	Mammalia	Rodentia	Castoridae
North American Porcupine	*Erethizon dorsatum*	Mammalia	Rodentia	Erethizontidae
Eastern Gray Squirrel	*Sciurus carolinensis*	Mammalia	Rodentia	Sciuridae
Eastern Chipmunk	*Tamias striatus*	Mammalia	Rodentia	Sciuridae
American Red Squirrel	*Tamiasciurus hudsonicus*	Mammalia	Rodentia	Sciuridae
REPTILES				
Smooth Greensnake	*Opheodrys vernalis*	Reptilia	Squamata	Colubridae
Common Garter Snake	*Thamnophis sirtalis*	Reptilia	Squamata	Colubridae
GASTROPODS				
Arion Slugs	*Arion spp.*	Gastropoda	Stylommatophora	Arionidae
	Megapallifera spp.	Gastropoda	Stylommatophora	Philomycidae
Winding Mantleslug	*Philomycus flexuolaris*	Gastropoda	Stylommatophora	Philomycidae
Beech Leaf Disease	*Litylenchus crenatae*	Chromadorea	Rhabditida	Anguinidae
FUNGI AND LICHEN				
Mountain Laurel Leaf Spot	*Mycosphaerella colorata*	Dothideomycetes	Mycosphaerellales	Mycosphaerellaceae
Common Strawberry Spot	*Ramularia grevilleana*	Dothideomycetes	Mycosphaerellales	Mycosphaerellaceae
Speckled Blister Lichen	*Viridothelium virens*	Dothideomycetes	Trypetheliales	Trypetheliaceae
Mealy Pixie Cup	*Cladonia chlorophaea*	Lecanoromycetes	Lecanorales	Cladoniaceae
British soldier lichen	*Cladonia cristatella*	Lecanoromycetes	Lecanorales	Cladoniaceae
many-forked cladonia	*Cladonia furcata*	Lecanoromycetes	Lecanorales	Cladoniaceae
Lipstick Powderhorn	*Cladonia macilenta*	Lecanoromycetes	Lecanorales	Cladoniaceae
Red-fruited Pixie Cup	*Cladonia pleurota*	Lecanoromycetes	Lecanorales	Cladoniaceae
Dragon Horn	*Cladonia squamosa*	Lecanoromycetes	Lecanorales	Cladoniaceae
common greenshield lichen	*Flavoparmelia caperata*	Lecanoromycetes	Lecanorales	Parmeliaceae
Bottlebrush Shield Lichen	*Parmelia squarrosa*	Lecanoromycetes	Lecanorales	Parmeliaceae
rough speckled shield lichen	*Punctelia rudecta*	Lecanoromycetes	Lecanorales	Parmeliaceae
beard lichens	*Usnea spp.*	Lecanoromycetes	Lecanorales	Parmeliaceae
Yellow Ribbon Lichen	*Usnocetraria oakesiana*	Lecanoromycetes	Lecanorales	Parmeliaceae
Smokey-eyed Boulder Lichen	*Porpidia albocaerulescens*	Lecanoromycetes	Lecideales	Lecideaceae
concentric boulder lichen	*Porpidia crustulata*	Lecanoromycetes	Lecideales	Lecideaceae
Common Script Lichen	*Graphis scripta*	Lecanoromycetes	Ostropales	Graphidaceae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
Pink Earth Lichen	*Dibaeis baeomyces*	Lecanoromycetes	Pertusariales	Icmadophilaceae
Smooth Rock Tripe	*Umbilicaria mammulata*	Lecanoromycetes	Umbilicariales	Umbilicariaceae
	Mitrulaceae (Family)	Leotiomycetes	Helotiales	Mitrulaceae
Chicken Lips	*Leotia viscosa*	Leotiomycetes	Leotiales	Leotiaceae
Earth Tongues	*Geoglossum spp.*	Lichinomycetes	Geoglossales	Geoglossaceae
	Tubakia spp.	Sordariomycetes	Diaporthales	Tubakiaceae
Beech Bark Canker Fungus	*Neonectria faginata*	Sordariomycetes	Hypocreales	Nectriaceae
Beechwood Woodwart	*Jackrogersella cohaerens*	Sordariomycetes	Xylariales	Hypoxylaceae
amanita mushrooms	*Amanita spp.*	Agaricomycetes	Agaricales	Amanitaceae
Golden Spindles	*Clavulinopsis fusiformis*	Agaricomycetes	Agaricales	Clavariaceae
orange gilled waxcap	*Humidicutis marginata*	Agaricomycetes	Agaricales	Hygrophoraceae
Waxcaps	*Hygrocybe spp.*	Agaricomycetes	Agaricales	Hygrophoraceae
	Apioperdon spp.	Agaricomycetes	Agaricales	Lycoperdaceae
Oyster Mushrooms	*Pleurotus spp.*	Agaricomycetes	Agaricales	Pleurotaceae
chaga	*Inonotus obliquus*	Agaricomycetes	Hymenochaetales	Hymenochaetaceae
birch polypore	*Fomitopsis betulina*	Agaricomycetes	Polyporales	Fomitopsidaceae
Smoky polypore	*Bjerkandera adusta*	Agaricomycetes	Polyporales	Phanerochaetaceae
Tinder Polypore	*Fomes excavatus*	Agaricomycetes	Polyporales	Polyporaceae
hemlock varnish shelf	*Ganoderma tsugae*	Agaricomycetes	Polyporales	Polyporaceae
crown-tipped coral fungus	*Artomyces pyxidatus*	Agaricomycetes	Russulales	Auriscalpiaceae
Orange Jelly Spot	*Dacrymyces chrysospermus*	Dacrymycetes	Dacrymycetales	Dacrymycetaceae
Lingonberry Gall	*Exobasidium vaccinii*	Exobasidiomycetes	Exobasidiales	Exobasidiaceae
goldenrod rust	*Coleosporium solidaginis*	Pucciniomycetes	Pucciniales	Coleosporiaceae
white pine blister rust	*Cronartium ribicola*	Pucciniomycetes	Pucciniales	Coleosporiaceae
blackberry orange rust	*Gymnoconia peckiana*	Pucciniomycetes	Pucciniales	Phragmidiaceae
Crown Rust	*Puccinia coronata*	Pucciniomycetes	Pucciniales	Pucciniaceae
	Uromyces halstedii	Pucciniomycetes	Pucciniales	Pucciniaceae
Huckleberry Broom Rust Fungus	*Calyptospora columnaris*	Pucciniomycetes	Pucciniales	Pucciniastraceae
snow fungus	*Tremella fuciformis*	Tremellomycetes	Tremellales	Tremellaceae
	Furia ithacensis	Entomophthoromycetes	Entomophthorales	Entomophthoraceae
PLANTS				
	Aulacomnium spp.	Bryopsida	Aulacomniales	Aulacomniaceae
Calcareous and Allied Mosses	*Mnium spp.*	Bryopsida	Bryales	Mniaceae
Thyme and Allied Mosses	*Plagiomnium spp.*	Bryopsida	Bryales	Mniaceae
	Rhizomnium spp.	Bryopsida	Bryales	Mniaceae
Forkmosses	*Dicranum spp.*	Bryopsida	Dicranales	Dicranaceae

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Pincushion Moss	*Leucobryum glaucum*	Bryopsida	Dicranales	Leucobryaceae
Ciliate Hoarmoss	*Hedwigia ciliata*	Bryopsida	Hedwigiales	Hedwigiaceae
Heart-leaved Spear-moss	*Calliergon cordifolium*	Bryopsida	Hypnales	Calliergonaceae
Willow Moss	*Fontinalis antipyretica*	Bryopsida	Hypnales	Fontinalaceae
New England Willowmoss	*Fontinalis novae-angliae*	Bryopsida	Hypnales	Fontinalaceae
	Fontinalis sphagnifolia	Bryopsida	Hypnales	Fontinalaceae
Red-stemmed Feather Moss	*Pleurozium schreberi*	Bryopsida	Hypnales	Hylocomiaceae
brocade moss	*Callicladium imponens*	Bryopsida	Hypnales	Hypnaceae
Ostrich-plume Moss	*Ptilium crista-castrensis*	Bryopsida	Hypnales	Pylaisiaceae
fern mosses	*Thuidium spp.*	Bryopsida	Hypnales	Thuidiaceae
Crisped Pincushion complex	*Ulota spp.*	Bryopsida	Orthotrichales	Orthotrichaceae
Common Haircap Moss	*Polytrichum commune*	Polytrichopsida	Polytrichales	Polytrichaceae
Bog Haircap Moss	*Polytrichum strictum*	Polytrichopsida	Polytrichales	Polytrichaceae
Sphagnum mosses	*Sphagnum spp.*	Sphagnopsida	Sphagnales	Sphagnaceae
	Calypogeia spp.	Jungermanniopsida	Jungermanniales	Calypogeiaceae
greater whipwort	*Bazzania trilobata*	Jungermanniopsida	Jungermanniales	Lepidoziaceae
Grove Earwort	*Scapania nemorea*	Jungermanniopsida	Jungermanniales	Scapaniaceae
Water Earwort	*Scapania undulata*	Jungermanniopsida	Jungermanniales	Scapaniaceae
Ribbonwort	*Pallavicinia lyellii*	Jungermanniopsida	Pallaviciniales	Pallaviciniaceae
common pellia	*Pellia epiphylla*	Jungermanniopsida	Pelliales	Pelliaceae
New York Scalewort	*Frullania eboracensis*	Jungermanniopsida	Porellales	Frullaniaceae
Flat-leaved Scalewort	*Radula complanata*	Jungermanniopsida	Porellales	Radulaceae
Tree Fringewort	*Ptilidium pulcherrimum*	Jungermanniopsida	Ptilidiales	Ptilidiaceae
Jack-in-the-Pulpits complex	*Arisaema spp.*	Liliopsida	Alismatales	Araceae
marsh calla	*Calla palustris*	Liliopsida	Alismatales	Araceae
ribbon-leaved pondweed	*Potamogeton epihydrus*	Liliopsida	Alismatales	Potamogetonaceae
Canada mayflower	*Maianthemum canadense*	Liliopsida	Asparagales	Asparagaceae
Solomon's plume	*Maianthemum racemosum*	Liliopsida	Asparagales	Asparagaceae
hairy Solomon's-seal	*Polygonatum pubescens*	Liliopsida	Asparagales	Asparagaceae
Yellow Iris	*Iris pseudacorus*	Liliopsida	Asparagales	Iridaceae
northern blue flag	*Iris versicolor*	Liliopsida	Asparagales	Iridaceae
blue-eyed grasses	*Sisyrinchium spp.*	Liliopsida	Asparagales	Iridaceae
pink lady's slipper	*Cypripedium acaule*	Liliopsida	Asparagales	Orchidaceae
downy rattlesnake plantain	*Goodyera pubescens*	Liliopsida	Asparagales	Orchidaceae
small green wood orchid	*Platanthera clavellata*	Liliopsida	Asparagales	Orchidaceae
Greater Purple Fringed Orchid	*Platanthera grandiflora*	Liliopsida	Asparagales	Orchidaceae
Rose Pogonia	*Pogonia ophioglossoides*	Liliopsida	Asparagales	Orchidaceae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
sessile bellwort	*Uvularia sessilifolia*	Liliopsida	Liliales	Colchicaceae
bluebead lily	*Clintonia borealis*	Liliopsida	Liliales	Liliaceae
Cucumber Root	*Medeola virginiana*	Liliopsida	Liliales	Liliaceae
red trillium	*Trillium erectum*	Liliopsida	Liliales	Melanthiaceae
painted trillium	*Trillium undulatum*	Liliopsida	Liliales	Melanthiaceae
green false hellebore	*Veratrum viride*	Liliopsida	Liliales	Melanthiaceae
white-edge sedge	*Carex debilis*	Liliopsida	Poales	Cyperaceae
northern long sedge	*Carex folliculata*	Liliopsida	Poales	Cyperaceae
nodding sedge	*Carex gynandra*	Liliopsida	Poales	Cyperaceae
bladder sedge	*Carex intumescens*	Liliopsida	Poales	Cyperaceae
sallow sedge	*Carex lurida*	Liliopsida	Poales	Cyperaceae
Greater Straw Sedge	*Carex normalis*	Liliopsida	Poales	Cyperaceae
eastern rough sedge	*Carex scabrata*	Liliopsida	Poales	Cyperaceae
pointed broom sedge	*Carex scoparia*	Liliopsida	Poales	Cyperaceae
tussock sedge	*Carex stricta*	Liliopsida	Poales	Cyperaceae
threeseeded sedge	*Carex trisperma*	Liliopsida	Poales	Cyperaceae
Northwest Territory sedge	*Carex utriculata*	Liliopsida	Poales	Cyperaceae
Three-way Sedge	*Dulichium arundinaceum*	Liliopsida	Poales	Cyperaceae
Blunt Spikerush	*Eleocharis obtusa*	Liliopsida	Poales	Cyperaceae
tawny cotton-grass	*Eriophorum virginicum*	Liliopsida	Poales	Cyperaceae
brownish beaked-rush	*Rhynchospora capitellata*	Liliopsida	Poales	Cyperaceae
woolgrass	*Scirpus cyperinus*	Liliopsida	Poales	Cyperaceae
mosquito bulrush	*Scirpus hattorianus*	Liliopsida	Poales	Cyperaceae
Panicled Bulrush	*Scirpus microcarpus*	Liliopsida	Poales	Cyperaceae
rushes	*Juncus spp.*	Liliopsida	Poales	Juncaceae
woodrushes	*Luzula spp.*	Liliopsida	Poales	Juncaceae
sweet vernal grass	*Anthoxanthum odoratum*	Liliopsida	Poales	Poaceae
Shorthusks	*Brachyelytrum spp.*	Liliopsida	Poales	Poaceae
canadian bluejoint	*Calamagrostis canadensis*	Liliopsida	Poales	Poaceae
Oatgrasses	*Danthonia spp.*	Liliopsida	Poales	Poaceae
deertongue	*Dichanthelium clandestinum*	Liliopsida	Poales	Poaceae
	Dichanthelium acuminatum (complex)	Liliopsida	Poales	Poaceae
rattlesnake mannagrass	*Glyceria canadensis*	Liliopsida	Poales	Poaceae
Slender Mannagrass	*Glyceria melicaria*	Liliopsida	Poales	Poaceae
rice cutgrass	*Leersia oryzoides*	Liliopsida	Poales	Poaceae
American bur-reed	*Sparganium americanum*	Liliopsida	Poales	Typhaceae
Cattails	*Typha spp.*	Liliopsida	Poales	Typhaceae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
prickly tree-clubmoss	*Dendrolycopodium dendroideum*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
Hickey's tree-clubmoss	*Dendrolycopodium hickeyi*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
flat-branched tree-clubmoss	*Dendrolycopodium obscurum*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
fan clubmoss	*Diphasiastrum digitatum*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
blue clubmoss	*Diphasiastrum tristachyum*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
shining firmoss	*Huperzia lucidula*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
stag's-horn clubmoss	*Lycopodium clavatum*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
interrupted clubmoss	*Spinulum annotinum*	Lycopodiopsida	Lycopodiales	Lycopodiaceae
golden Alexanders	*Zizia aurea*	Magnoliopsida	Apiales	Apiaceae
bristly sarsaparilla	*Aralia hispida*	Magnoliopsida	Apiales	Araliaceae
wild sarsaparilla	*Aralia nudicaulis*	Magnoliopsida	Apiales	Araliaceae
American Water-pennywort	*Hydrocotyle americana*	Magnoliopsida	Apiales	Araliaceae
dwarf ginseng	*Panax trifolius*	Magnoliopsida	Apiales	Araliaceae
Mountain holly	*Ilex mucronata*	Magnoliopsida	Aquifoliales	Aquifoliaceae
winterberry holly	*Ilex verticillata*	Magnoliopsida	Aquifoliales	Aquifoliaceae
Bull Thistle	*Cirsium vulgare*	Magnoliopsida	Asterales	Asteraceae
flat-top white aster	*Doellingeria umbellata*	Magnoliopsida	Asterales	Asteraceae
American burnweed	*Erechtites hieraciifolius*	Magnoliopsida	Asterales	Asteraceae
common boneset	*Eupatorium perfoliatum*	Magnoliopsida	Asterales	Asteraceae
White Wood Aster	*Eurybia divaricata*	Magnoliopsida	Asterales	Asteraceae
flat-topped goldenrod	*Euthamia graminifolia*	Magnoliopsida	Asterales	Asteraceae
coastal plain Joe-Pye weed	*Eutrochium dubium*	Magnoliopsida	Asterales	Asteraceae
spotted Joe-Pye weed	*Eutrochium maculatum*	Magnoliopsida	Asterales	Asteraceae
Panicled Hawkweed	*Hieracium paniculatum*	Magnoliopsida	Asterales	Asteraceae
Canada wild lettuce	*Lactuca canadensis*	Magnoliopsida	Asterales	Asteraceae
oxeye daisy	*Leucanthemum vulgare*	Magnoliopsida	Asterales	Asteraceae
Wall Lettuce	*Mycelis muralis*	Magnoliopsida	Asterales	Asteraceae
rattlesnake roots	*Nabalus spp.*	Magnoliopsida	Asterales	Asteraceae
whorled wood aster	*Oclemena acuminata*	Magnoliopsida	Asterales	Asteraceae
bog aster	*Oclemena nemoralis*	Magnoliopsida	Asterales	Asteraceae
golden ragwort	*Packera aurea*	Magnoliopsida	Asterales	Asteraceae
meadow hawkweed	*Pilosella caespitosa*	Magnoliopsida	Asterales	Asteraceae
silverrod	*Solidago bicolor*	Magnoliopsida	Asterales	Asteraceae
giant goldenrod	*Solidago gigantea*	Magnoliopsida	Asterales	Asteraceae
field goldenrod	*Solidago nemoralis*	Magnoliopsida	Asterales	Asteraceae
Downy Goldenrod	*Solidago puberula*	Magnoliopsida	Asterales	Asteraceae
calico aster	*Symphyotrichum lateriflorum*	Magnoliopsida	Asterales	Asteraceae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
New York aster	*Symphyotrichum novi-belgii*	Magnoliopsida	Asterales	Asteraceae
Indian tobacco	*Lobelia inflata*	Magnoliopsida	Asterales	Campanulaceae
spoonleaf sundew	*Drosera intermedia*	Magnoliopsida	Caryophyllales	Droseraceae
round-leaved sundew	*Drosera rotundifolia*	Magnoliopsida	Caryophyllales	Droseraceae
fringed black bindweed	*Parogonum ciliinode*	Magnoliopsida	Caryophyllales	Polygonaceae
halberd-leaved tearthumb	*Persicaria arifolia*	Magnoliopsida	Caryophyllales	Polygonaceae
arrow-leaved tearthumb	*Persicaria sagittata*	Magnoliopsida	Caryophyllales	Polygonaceae
Oriental bittersweet	*Celastrus orbiculatus*	Magnoliopsida	Celastrales	Celastraceae
Canadian bunchberry	*Cornus canadensis*	Magnoliopsida	Cornales	Cornaceae
Black Tupelo	*Nyssa sylvatica*	Magnoliopsida	Cornales	Nyssaceae
northern bush honeysuckle	*Diervilla lonicera*	Magnoliopsida	Dipsacales	Caprifoliaceae
American black elderberry	*Sambucus canadensis*	Magnoliopsida	Dipsacales	Viburnaceae
mapleleaf viburnum	*Viburnum acerifolium*	Magnoliopsida	Dipsacales	Viburnaceae
northern wild raisin	*Viburnum cassinoides*	Magnoliopsida	Dipsacales	Viburnaceae
southern arrowwood	*Viburnum dentatum*	Magnoliopsida	Dipsacales	Viburnaceae
hobblebush	*Viburnum lantanoides*	Magnoliopsida	Dipsacales	Viburnaceae
common jewelweed	*Impatiens capensis*	Magnoliopsida	Ericales	Balsaminaceae
leatherleaf	*Chamaedaphne calyculata*	Magnoliopsida	Ericales	Ericaceae
striped wintergreen	*Chimaphila maculata*	Magnoliopsida	Ericales	Ericaceae
pipsissewa	*Chimaphila umbellata*	Magnoliopsida	Ericales	Ericaceae
trailing arbutus	*Epigaea repens*	Magnoliopsida	Ericales	Ericaceae
creeping snowberry	*Gaultheria hispidula*	Magnoliopsida	Ericales	Ericaceae
Eastern Teaberry	*Gaultheria procumbens*	Magnoliopsida	Ericales	Ericaceae
black huckleberry	*Gaylussacia baccata*	Magnoliopsida	Ericales	Ericaceae
sheep laurel	*Kalmia angustifolia*	Magnoliopsida	Ericales	Ericaceae
mountain laurel	*Kalmia latifolia*	Magnoliopsida	Ericales	Ericaceae
He-huckleberry	*Lyonia ligustrina*	Magnoliopsida	Ericales	Ericaceae
pinesap	*Monotropa hypopitys*	Magnoliopsida	Ericales	Ericaceae
Ghost Pipe	*Monotropa uniflora*	Magnoliopsida	Ericales	Ericaceae
shinleaf	*Pyrola elliptica*	Magnoliopsida	Ericales	Ericaceae
Rhodora	*Rhododendron canadense*	Magnoliopsida	Ericales	Ericaceae
Bog Labrador Tea	*Rhododendron groenlandicum*	Magnoliopsida	Ericales	Ericaceae
lowbush blueberry	*Vaccinium angustifolium*	Magnoliopsida	Ericales	Ericaceae
Northern highbush blueberry	*Vaccinium corymbosum*	Magnoliopsida	Ericales	Ericaceae
velvetleaf blueberry	*Vaccinium myrtilloides*	Magnoliopsida	Ericales	Ericaceae
northern starflower	*Lysimachia borealis*	Magnoliopsida	Ericales	Primulaceae
fringed loosestrife	*Lysimachia ciliata*	Magnoliopsida	Ericales	Primulaceae

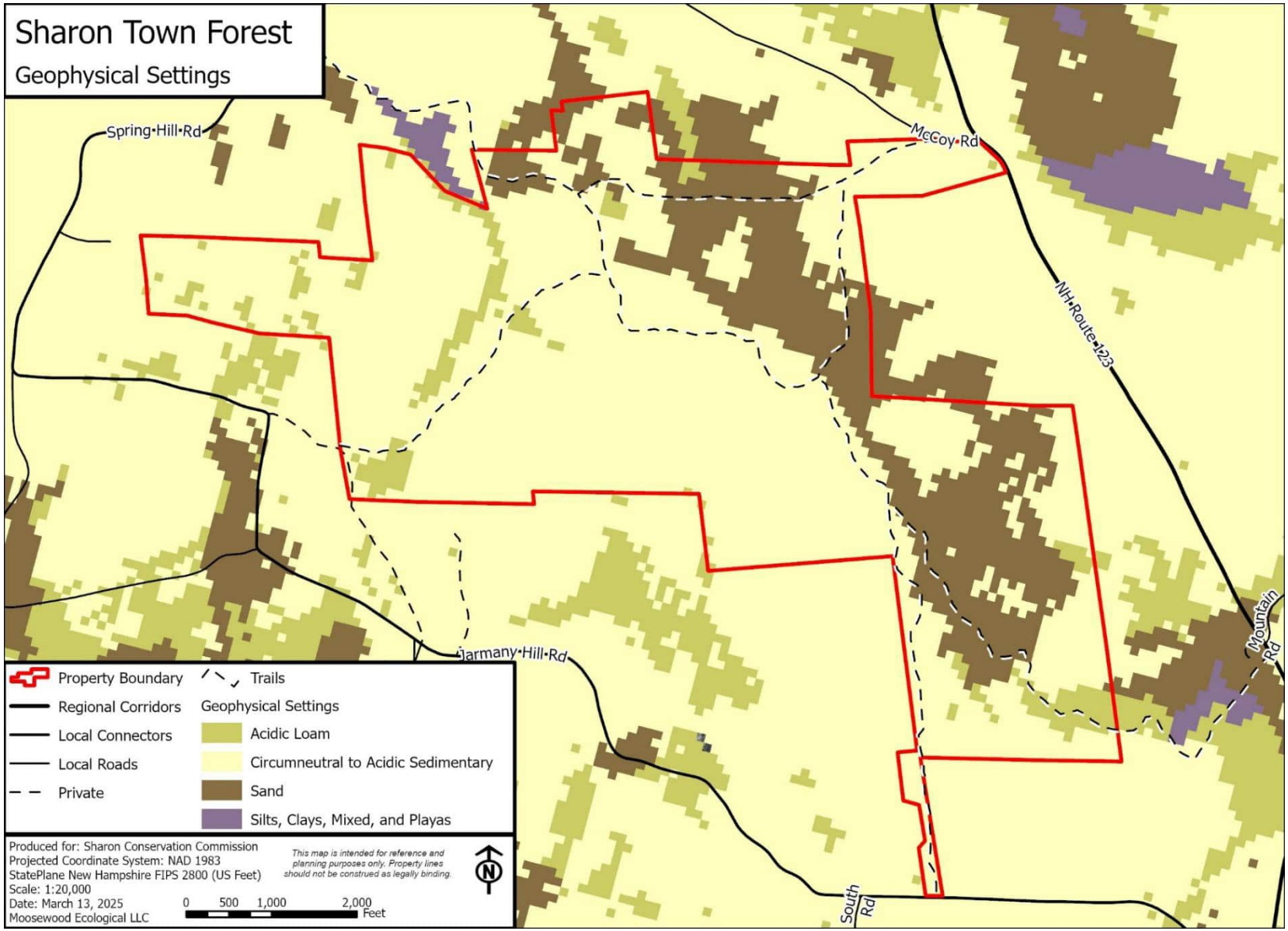
Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
swamp candles	*Lysimachia terrestris*	Magnoliopsida	Ericales	Primulaceae
large hop clover	*Trifolium aureum*	Magnoliopsida	Fabales	Fabaceae
Red Clover	*Trifolium pratense*	Magnoliopsida	Fabales	Fabaceae
tufted vetch	*Vicia cracca*	Magnoliopsida	Fabales	Fabaceae
racemed milkwort	*Senega polygama*	Magnoliopsida	Fabales	Polygalaceae
gray alder	*Alnus incana*	Magnoliopsida	Fagales	Betulaceae
yellow birch	*Betula alleghaniensis*	Magnoliopsida	Fagales	Betulaceae
heartleaf paper birch	*Betula cordifolia*	Magnoliopsida	Fagales	Betulaceae
sweet birch	*Betula lenta*	Magnoliopsida	Fagales	Betulaceae
paper birch	*Betula papyrifera*	Magnoliopsida	Fagales	Betulaceae
gray birch	*Betula populifolia*	Magnoliopsida	Fagales	Betulaceae
hazels	*Corylus spp.*	Magnoliopsida	Fagales	Betulaceae
American chestnut	*Castanea dentata*	Magnoliopsida	Fagales	Fagaceae
American beech	*Fagus grandifolia*	Magnoliopsida	Fagales	Fagaceae
northern red oak	*Quercus rubra*	Magnoliopsida	Fagales	Fagaceae
spreading dogbane	*Apocynum androsaemifolium*	Magnoliopsida	Gentianales	Apocynaceae
common milkweed	*Asclepias syriaca*	Magnoliopsida	Gentianales	Apocynaceae
Narrowleaf Gentian	*Gentiana linearis*	Magnoliopsida	Gentianales	Gentianaceae
Stiff Marsh Bedstraw	*Galium tinctorium*	Magnoliopsida	Gentianales	Rubiaceae
three-petal bedstraw	*Galium trifidum*	Magnoliopsida	Gentianales	Rubiaceae
fragrant bedstraw	*Galium triflorum*	Magnoliopsida	Gentianales	Rubiaceae
azure bluet	*Houstonia caerulea*	Magnoliopsida	Gentianales	Rubiaceae
partridgeberry	*Mitchella repens*	Magnoliopsida	Gentianales	Rubiaceae
northern bugleweed	*Lycopus uniflorus*	Magnoliopsida	Lamiales	Lamiaceae
common selfheal	*Prunella vulgaris*	Magnoliopsida	Lamiales	Lamiaceae
Marsh Skullcap	*Scutellaria galericulata*	Magnoliopsida	Lamiales	Lamiaceae
side-flowering skullcap	*Scutellaria lateriflora*	Magnoliopsida	Lamiales	Lamiaceae
common bladderwort	*Utricularia macrorhiza*	Magnoliopsida	Lamiales	Lentibulariaceae
white ash	*Fraxinus americana*	Magnoliopsida	Lamiales	Oleaceae
narrowleaf cow wheat	*Melampyrum lineare*	Magnoliopsida	Lamiales	Orobanchaceae
Allegheny monkeyflower	*Mimulus ringens*	Magnoliopsida	Lamiales	Phrymaceae
Narrow-fruited Water-starwort	*Callitriche palustris*	Magnoliopsida	Lamiales	Plantaginaceae
white turtlehead	*Chelone glabra*	Magnoliopsida	Lamiales	Plantaginaceae
heath speedwell	*Veronica officinalis*	Magnoliopsida	Lamiales	Plantaginaceae
Marsh Speedwell	*Veronica scutellata*	Magnoliopsida	Lamiales	Plantaginaceae
northern spicebush	*Lindera benzoin*	Magnoliopsida	Laurales	Lauraceae
Canada St. John's wort	*Hypericum canadense*	Magnoliopsida	Malpighiales	Hypericaceae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
bigtooth aspen	*Populus grandidentata*	Magnoliopsida	Malpighiales	Salicaceae
quaking aspen	*Populus tremuloides*	Magnoliopsida	Malpighiales	Salicaceae
silky willow	*Salix sericea*	Magnoliopsida	Malpighiales	Salicaceae
downy blue violet	*Viola fimbriatula*	Magnoliopsida	Malpighiales	Violaceae
white bog violet	*Viola lanceolata*	Magnoliopsida	Malpighiales	Violaceae
northern white violet	*Viola minuscula*	Magnoliopsida	Malpighiales	Violaceae
kidneyleaf white violet	*Viola renifolia*	Magnoliopsida	Malpighiales	Violaceae
Round-leaved Violet	*Viola rotundifolia*	Magnoliopsida	Malpighiales	Violaceae
Pinweeds	*Lechea spp.*	Magnoliopsida	Malvales	Cistaceae
fireweed	*Chamaenerion angustifolium*	Magnoliopsida	Myrtales	Onagraceae
Alpine Enchanter's-nightshade	*Circaea alpina*	Magnoliopsida	Myrtales	Onagraceae
cinnamon willowherb	*Epilobium coloratum*	Magnoliopsida	Myrtales	Onagraceae
Water Purslane	*Ludwigia palustris*	Magnoliopsida	Myrtales	Onagraceae
Variegated Yellow Pond-Lily	*Nuphar variegata*	Magnoliopsida	Nymphaeales	Nymphaeaceae
mountain woodsorrel	*Oxalis montana*	Magnoliopsida	Oxalidales	Oxalidaceae
Japanese barberry	*Berberis thunbergii*	Magnoliopsida	Ranunculales	Berberidaceae
wood anemone	*Anemonoides quinquefolia*	Magnoliopsida	Ranunculales	Ranunculaceae
threeleaf goldthread	*Coptis trifolia*	Magnoliopsida	Ranunculales	Ranunculaceae
meadow buttercup	*Ranunculus acris*	Magnoliopsida	Ranunculales	Ranunculaceae
tall meadow-rue	*Thalictrum pubescens*	Magnoliopsida	Ranunculales	Ranunculaceae
glossy buckthorn	*Frangula alnus*	Magnoliopsida	Rosales	Rhamnaceae
chokeberries	*Aronia spp.*	Magnoliopsida	Rosales	Rosaceae
Virginia strawberry	*Fragaria virginiana*	Magnoliopsida	Rosales	Rosaceae
avens	*Geum spp.*	Magnoliopsida	Rosales	Rosaceae
common cinquefoil	*Potentilla simplex*	Magnoliopsida	Rosales	Rosaceae
black cherry	*Prunus serotina*	Magnoliopsida	Rosales	Rosaceae
chokecherry	*Prunus virginiana*	Magnoliopsida	Rosales	Rosaceae
multiflora rose	*Rosa multiflora*	Magnoliopsida	Rosales	Rosaceae
dewdrop	*Rubus dalibarda*	Magnoliopsida	Rosales	Rosaceae
Common Dewberry	*Rubus flagellaris*	Magnoliopsida	Rosales	Rosaceae
swamp dewberry	*Rubus hispidus*	Magnoliopsida	Rosales	Rosaceae
red raspberry	*Rubus idaeus*	Magnoliopsida	Rosales	Rosaceae
dwarf raspberry	*Rubus pubescens*	Magnoliopsida	Rosales	Rosaceae
American mountain ash	*Sorbus americana*	Magnoliopsida	Rosales	Rosaceae
white meadowsweet	*Spiraea alba*	Magnoliopsida	Rosales	Rosaceae
Steeplebush	*Spiraea tomentosa*	Magnoliopsida	Rosales	Rosaceae
slender stinging nettle	*Urtica gracilis*	Magnoliopsida	Rosales	Urticaceae

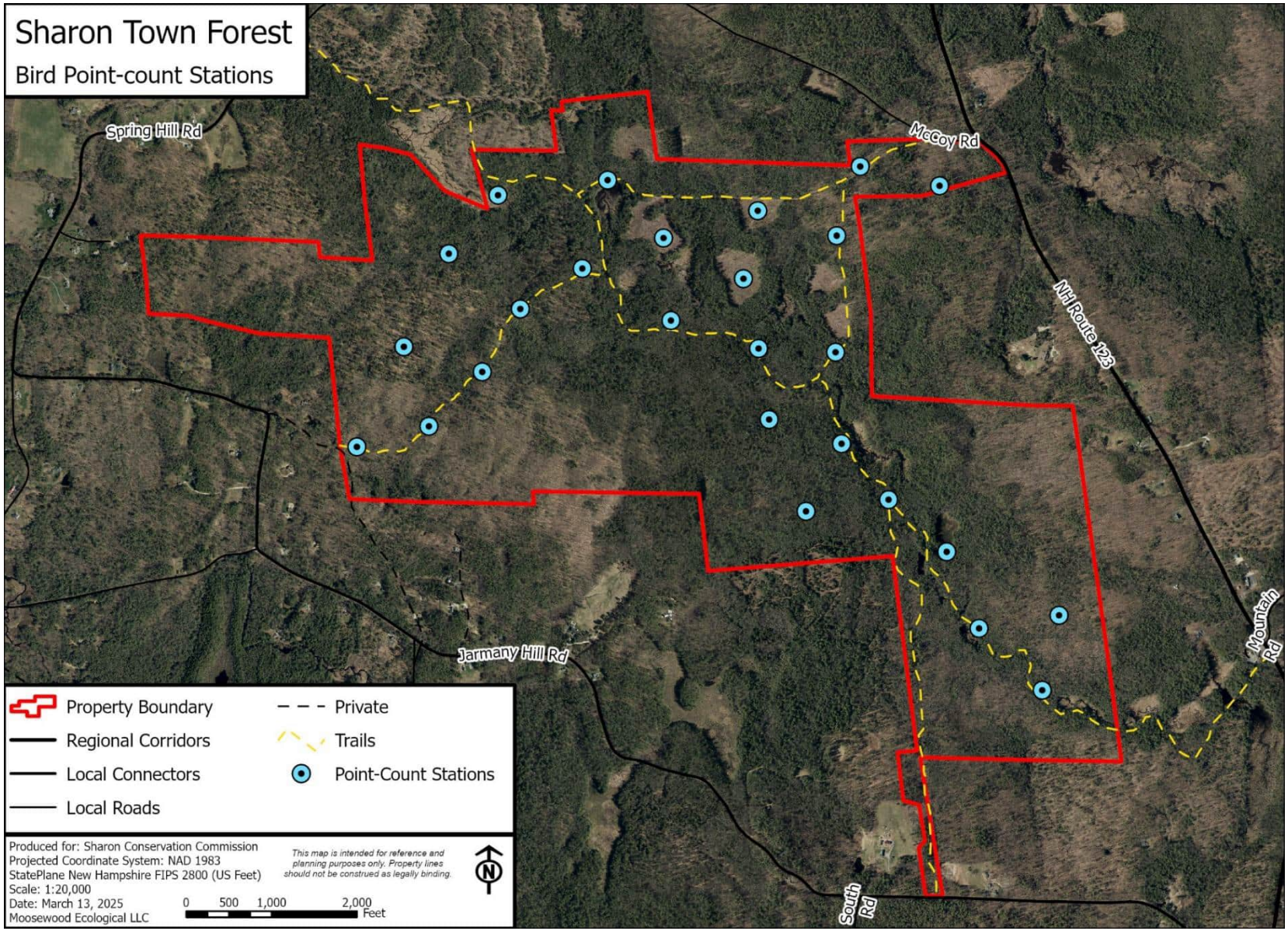
Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
eastern poison ivy	*Toxicodendron radicans*	Magnoliopsida	Sapindales	Anacardiaceae
striped maple	*Acer pensylvanicum*	Magnoliopsida	Sapindales	Sapindaceae
red maple	*Acer rubrum*	Magnoliopsida	Sapindales	Sapindaceae
sugar maple	*Acer saccharum*	Magnoliopsida	Sapindales	Sapindaceae
common witch-hazel	*Hamamelis virginiana*	Magnoliopsida	Saxifragales	Hamamelidaceae
American golden saxifrage	*Chrysosplenium americanum*	Magnoliopsida	Saxifragales	Saxifragaceae
Creeping Foamflower	*Tiarella stolonifera*	Magnoliopsida	Saxifragales	Saxifragaceae
grapevines	*Vitis spp.*	Magnoliopsida	Vitales	Vitaceae
common juniper	*Juniperus communis*	Pinopsida	Pinales	Cupressaceae
balsam fir	*Abies balsamea*	Pinopsida	Pinales	Pinaceae
white spruce	*Picea glauca*	Pinopsida	Pinales	Pinaceae
red spruce	*Picea rubens*	Pinopsida	Pinales	Pinaceae
red pine	*Pinus resinosa*	Pinopsida	Pinales	Pinaceae
pitch pine	*Pinus rigida*	Pinopsida	Pinales	Pinaceae
eastern white pine	*Pinus strobus*	Pinopsida	Pinales	Pinaceae
eastern hemlock	*Tsuga canadensis*	Pinopsida	Pinales	Pinaceae
wood horsetail	*Equisetum sylvaticum*	Polypodiopsida	Equisetales	Equisetaceae
interrupted fern	*Osmunda claytoniana*	Polypodiopsida	Osmundales	Osmundaceae
American Royal Fern	*Osmunda spectabilis*	Polypodiopsida	Osmundales	Osmundaceae
cinnamon fern	*Osmundastrum cinnamomeum*	Polypodiopsida	Osmundales	Osmundaceae
northern lady fern	*Athyrium angustum*	Polypodiopsida	Polypodiales	Athyriaceae
northern oak fern	*Gymnocarpium dryopteris*	Polypodiopsida	Polypodiales	Cystopteridaceae
hay-scented fern	*Dennstaedtia punctilobula*	Polypodiopsida	Polypodiales	Dennstaedtiaceae
common bracken	*Pteridium aquilinum*	Polypodiopsida	Polypodiales	Dennstaedtiaceae
eagle fern	*Pteridium aquilinum*	Polypodiopsida	Polypodiales	Dennstaedtiaceae
spinulose wood fern	*Dryopteris carthusiana*	Polypodiopsida	Polypodiales	Dryopteridaceae
crested wood fern	*Dryopteris cristata*	Polypodiopsida	Polypodiales	Dryopteridaceae
intermediate wood fern	*Dryopteris intermedia*	Polypodiopsida	Polypodiales	Dryopteridaceae
marginal wood fern	*Dryopteris marginalis*	Polypodiopsida	Polypodiales	Dryopteridaceae
Christmas fern	*Polystichum acrostichoides*	Polypodiopsida	Polypodiales	Dryopteridaceae
sensitive fern	*Onoclea sensibilis*	Polypodiopsida	Polypodiales	Onocleaceae
rock polypody	*Polypodium virginianum*	Polypodiopsida	Polypodiales	Polypodiaceae
New York fern	*Amauropelta noveboracensis*	Polypodiopsida	Polypodiales	Thelypteridaceae
Massachusetts fern	*Coryphopteris simulata*	Polypodiopsida	Polypodiales	Thelypteridaceae
long beech fern	*Phegopteris connectilis*	Polypodiopsida	Polypodiales	Thelypteridaceae
marsh fern	*Thelypteris palustris*	Polypodiopsida	Polypodiales	Thelypteridaceae

Common Name	Scientific Name	Taxonomic Class	Taxonomic Order	Taxonomic Family
SLIME MOLDS				
Dog Vomit Slime Mold	*Fuligo septica*	Myxomycetes	Physarales	Physaraceae
	Tubifera spp.	Myxomycetes	Reticulariales	Reticulariaceae

APPENDIX C: SUPPLEMENTAL MAPS



Geophysical settings, or the generalized growing conditions based on soil and bedrock, as mapped by The Natura Conservancy.

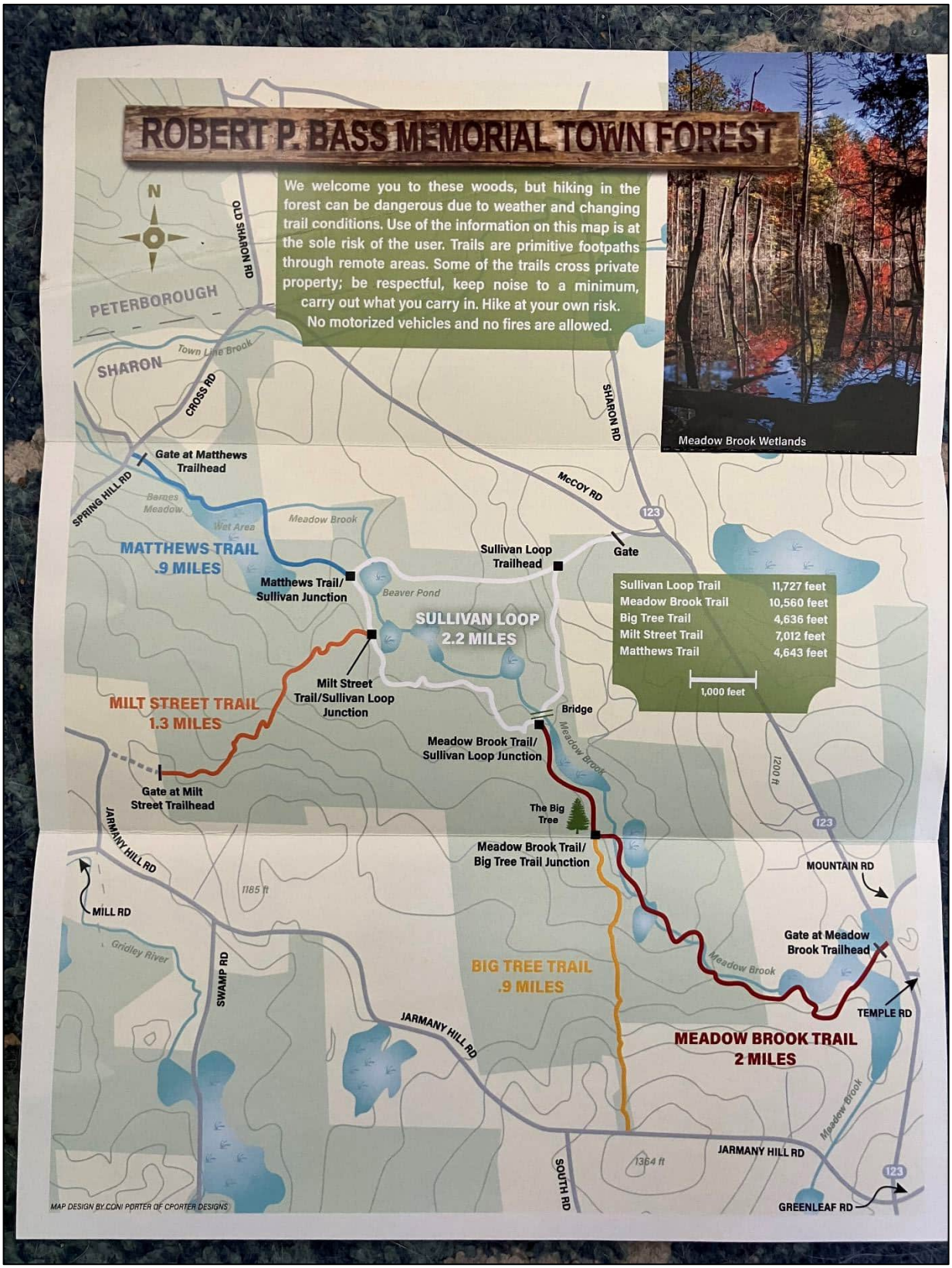


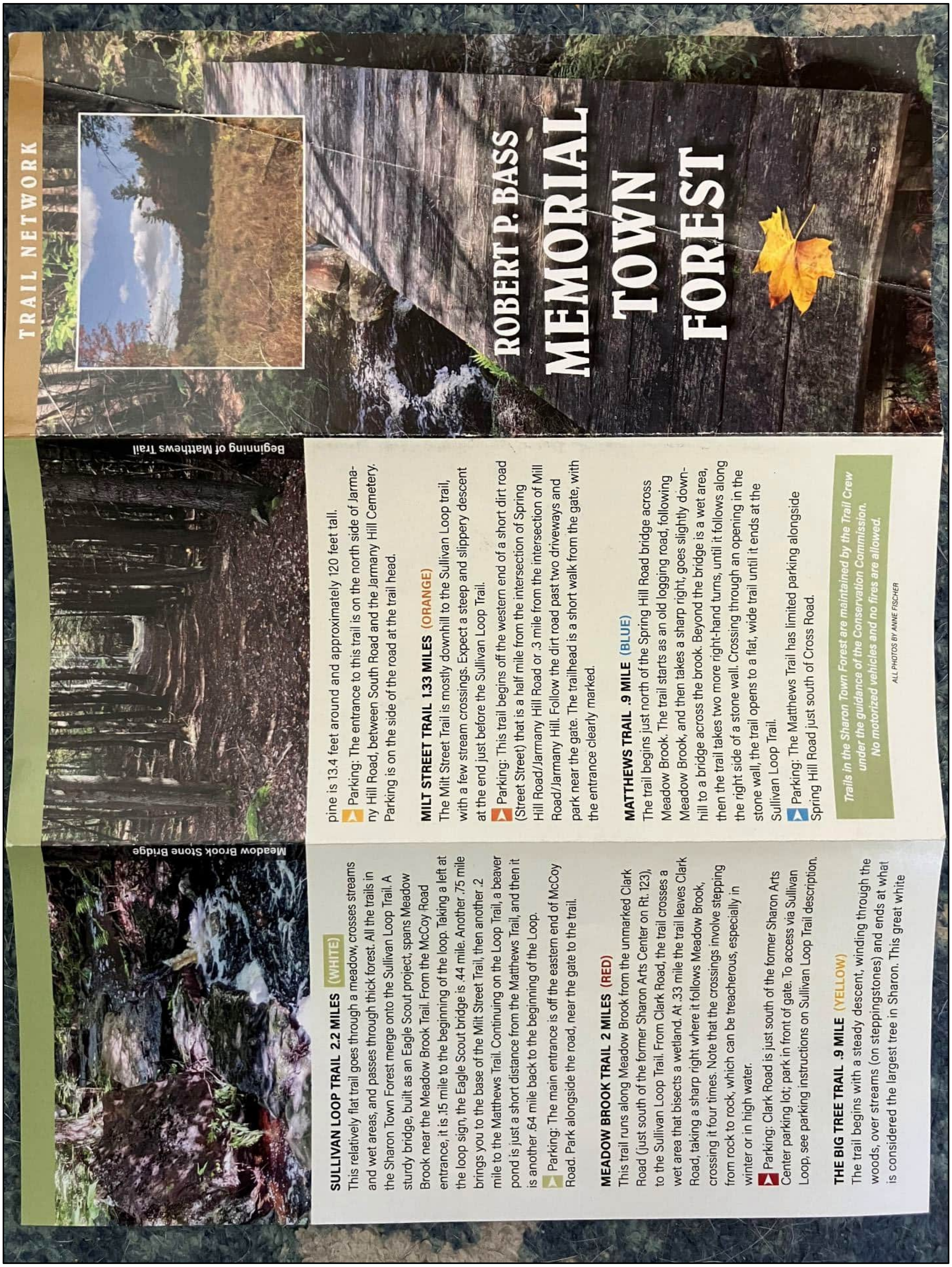
Locations of point-count stations used by breeding bird surveys at Sharon Town Forest.

APPENDIX D: HABITAT BLOCK SIZE REQUIREMENTS FOR SELECTED WILDLIFE

1-19 Acres	20-99 Acres	100-499 Acres	500-2,500 Acres	>2,500 Acres
raccoon	raccoon	raccoon	raccoon	raccoon
	hare	hare	hare	hare
				coyote
small rodent	small rodent	small rodent	small rodent	small rodent
	porcupine	porcupine	porcupine	porcupine
				bobcat
cottontail	cottontail	cottontail	cottontail	cottontail
	beaver	beaver	beaver	beaver
				black bear
squirrel	squirrel	squirrel	squirrel	squirrel
	weasel	weasel	weasel	weasel
		mink	mink	mink
				fisher
	woodchuck	woodchuck	woodchuck	woodchuck
		deer	deer	deer
muskrat	muskrat	muskrat	muskrat	muskrat
			moose	moose
red fox	red fox	red fox	red fox	red fox
songbirds	songbirds	songbirds	songbirds	songbirds
		sharp-shinned hawk	sharp-shinned hawk	sharp-shinned hawk
			bald eagle	bald eagle
skunk	skunk	skunk	skunk	skunk
		Cooper's hawk	Cooper's hawk	Cooper's hawk
		harrier	harrier	harrier
		broad-winged hawk	broad-winged hawk	broad-winged hawk
			goshawk	goshawk
		kestrel	kestrel	kestrel
			red-tailed hawk	red-tailed hawk
		great-horned owl	great-horned owl	great-horned owl
			raven	raven
		barred owl	barred owl	barred owl
		osprey	osprey	osprey
		turkey vulture	turkey vulture	turkey vulture
		turkey	turkey	turkey
most reptiles	most reptiles	reptiles	reptiles	reptiles
	garter snake	garter snake	garter snake	garter snake
	ring-necked snake	ring-necked snake	ring-necked snake	ring-necked snake
most amphibians	most amphibians	most amphibians	amphibians	amphibians
		wood frog	wood frog	wood frog

APPENDIX E: TRAIL MAP BROCHURE





Meadow Brook Stone Bridge

Beginning of Matthews Trail

TRAIL NETWORK

ROBERT P. BASS

MEMORIAL TOWN FOREST

SULLIVAN LOOP TRAIL 2.2 MILES (WHITE)

This relatively flat trail goes through a meadow, crosses streams and wet areas, and passes through thick forest. All the trails in the Sharon Town Forest merge onto the Sullivan Loop Trail. A sturdy bridge, built as an Eagle Scout project, spans Meadow Brook near the Meadow Brook Trail. From the McCoy Road entrance, it is .15 mile to the beginning of the loop. Taking a left at the loop sign, the Eagle Scout bridge is .44 mile. Another .75 mile brings you to the base of the Milt Street Trail, then another .2 mile to the Matthews Trail. Continuing on the Loop Trail, a beaver pond is just a short distance from the Matthews Trail, and then it is another .64 mile back to the beginning of the Loop.

Parking: The main entrance is off the eastern end of McCoy Road. Park alongside the road, near the gate to the trail.

MEADOW BROOK TRAIL 2 MILES (RED)

This trail runs along Meadow Brook from the unmarked Clark Road (just south of the former Sharon Arts Center on Rt. 123), to the Sullivan Loop Trail. From Clark Road, the trail crosses a wet area that bisects a wetland. At .33 mile the trail leaves Clark Road, taking a sharp right where it follows Meadow Brook, crossing it four times. Note that the crossings involve stepping from rock to rock, which can be treacherous, especially in winter or in high water.

Parking: Clark Road is just south of the former Sharon Arts Center parking lot; park in front of gate. To access via Sullivan Loop, see parking instructions on Sullivan Loop Trail description.

THE BIG TREE TRAIL .9 MILE (YELLOW)

The trail begins with a steady descent, winding through the woods, over streams (on steppingstones) and ends at what is considered the largest tree in Sharon. This great white pine is 13.4 feet around and approximately 120 feet tall.

Parking: The entrance to this trail is on the north side of Jarmany Hill Road, between South Road and the Jarmany Hill Cemetery. Parking is on the side of the road at the trail head.

MILT STREET TRAIL 1.33 MILES (ORANGE)

The Milt Street Trail is mostly downhill to the Sullivan Loop trail, with a few stream crossings. Expect a steep and slippery descent at the end just before the Sullivan Loop Trail.

Parking: This trail begins off the western end of a short dirt road (Street Street) that is a half mile from the intersection of Spring Hill Road/Jarmany Hill Road or .3 mile from the intersection of Mill Road/Jarmany Hill. Follow the dirt road past two driveways and park near the gate. The trailhead is a short walk from the gate, with the entrance clearly marked.

MATTHEWS TRAIL .9 MILE (BLUE)

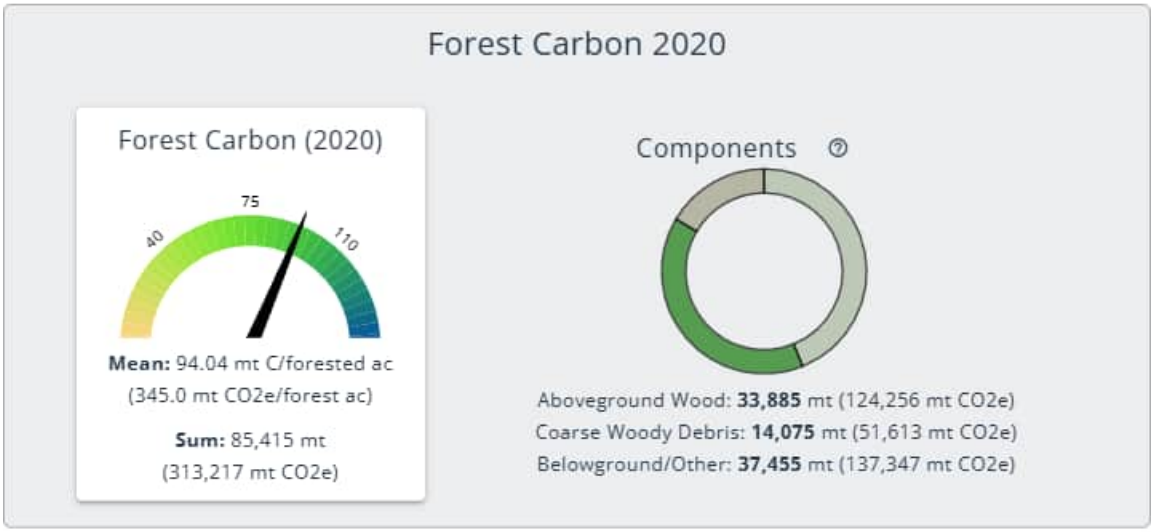
The trail begins just north of the Spring Hill Road bridge across Meadow Brook. The trail starts as an old logging road, following Meadow Brook, and then takes a sharp right, goes slightly downhill to a bridge across the brook. Beyond the bridge is a wet area, then the trail takes two more right-hand turns, until it follows along the right side of a stone wall. Crossing through an opening in the stone wall, the trail opens to a flat, wide trail until it ends at the Sullivan Loop Trail.

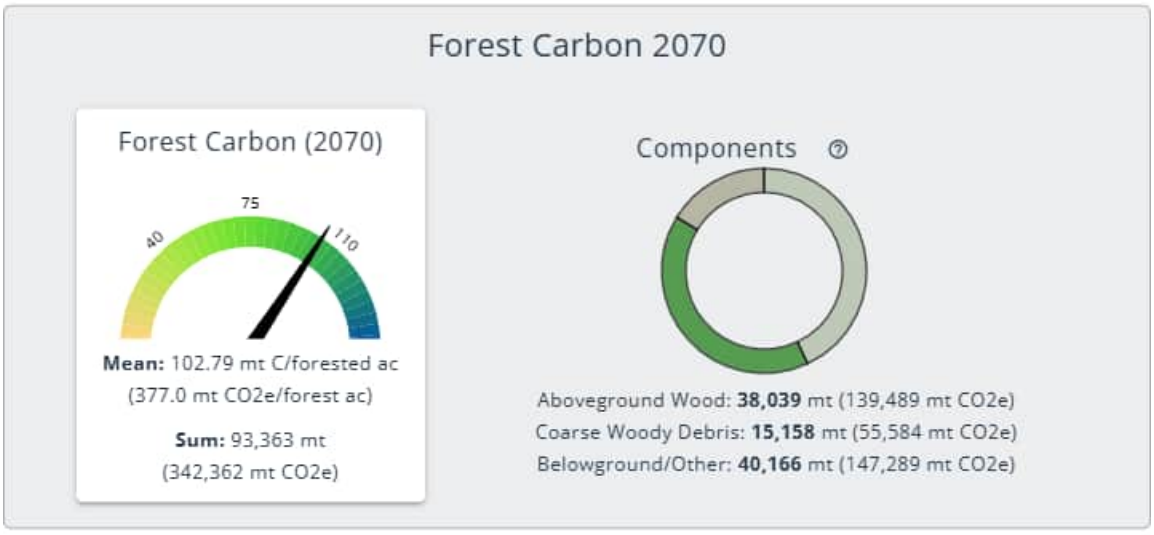
Parking: The Matthews Trail has limited parking alongside Spring Hill Road just south of Cross Road.

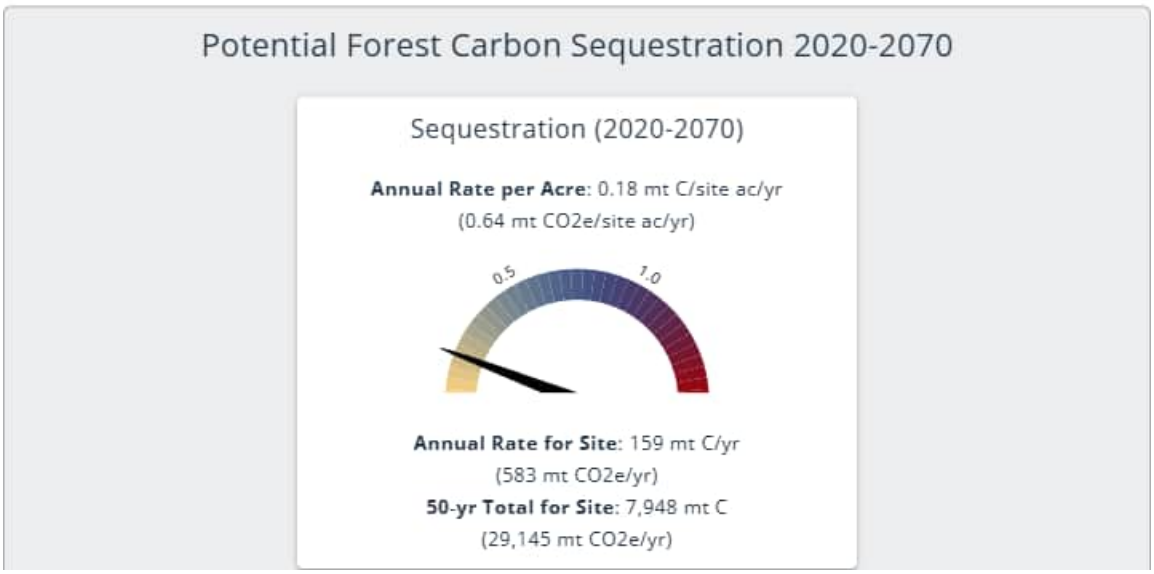
Trails in the Sharon Town Forest are maintained by the Trail Crew under the guidance of the Conservation Commission. No motorized vehicles and no fires are allowed.

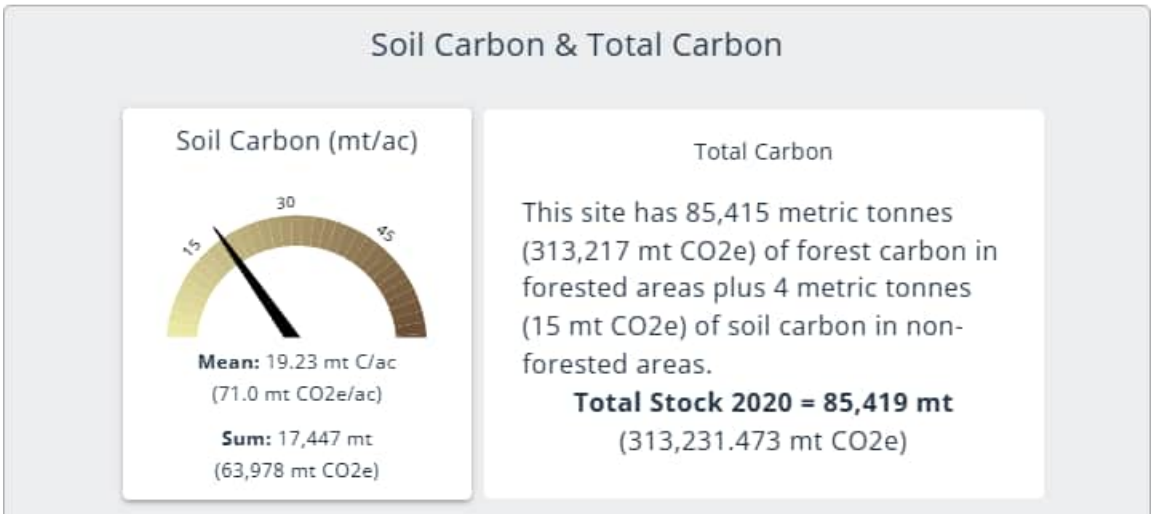
ALL PHOTOS BY ANNE FISCHER

APPENDIX F: FOREST CARBON ESTIMATES









Forest Carbon (2020)

Forest Carbon Estimates

The forest carbon data in the Resilience Lands Mapping Tool (RLMT) is from the newest update of the National Forest Carbon Monitoring System (NFCMS) - version 3.0 (Hasler & Williams 2025). The NFCMS is a comprehensive dataset of pixel-level carbon stocks and fluxes for the conterminous U.S. at a 30-m resolution and is derived from a combination of an inventory-constrained carbon cycle model, satellite-based aboveground biomass, satellite-based forest disturbance mapping, and a set of ancillary datasets characterizing additional forest attributes. It is based on a similar methodology to the published version of NFCMS (Williams et al. 2021) with significant updates in FIA-fitted carbon curves as well as forest extent and forest disturbance history. See https://www.maps.tnc.org/resilientland/#/explore

While the core method of the newer NFCMS v3 dataset is based on the previous release, significant improvements have been made to the methods. The current reference year is 2020, which was previously 2010. The forest extent and forest disturbances are based on the Land Change Monitoring, Assessment, and Projection (LCMAP, Pengra et al. 2020) dataset instead of the North American Forest Dynamics dataset (NAFD, Goward et al. 2015, Zhao et al. 2018). The fitting of the carbon curves to the FIA plot data has been improved.

In NFCMS v3, the following carbon pools are provided for years 2020, 2050, and 2070. The year 2020 is the “current” state of the forest, where disturbances such as harvest and fires up to 2020 have been accounted for. Years 2050 and 2070 are projected carbon stocks in a grow-only scenario where no disturbance nor changes in climate are considered. The grow-only scenario is an upper bound of possible carbon sequestration if no disturbance was to occur.

- Aboveground biomass (live woody material including stems, branches, and bark);
- Live biomass (aboveground biomass including leaves, and belowground biomass including fine roots) -this pool is provided instead of the individual belowground biomass, leaves, and fine roots;
- Soil carbon as the sum of all soil carbon layers;
- Total ecosystem carbon as the sum of all pool, including all live biomass, coarse woody debris (above- and below-ground), snag (when applicable), litter, and soil layers;

Data Attribution

The NFCMS v3 was developed by Dr. Natalia Hasler and Dr. Christopher Alan Williams of the Biogeosciences Research Group at Clark University for the Open Space Institute with additional support from the U.S. Forest Service Forest Legacy Program, Trust for Public Land, and The Nature Conservancy. The NFCMS v3 is published as a publicly available USFS dataset at this link.

Application in the Resilient Land Mapping Tool (RLMT)

For use in the RLMT, all NFCMS v3 units were converted from metric tonnes of CO2 per acre (Mg CO2 acres-1) to metric tonnes of carbon per pixel (Mg CO2 acres-1 * 0.0606475 where Mg CO2 acres-1/3.667 * 1 acre/4046.86 m2 * 900 m2/1 pixel = 1 metric tonne carbon/pixel) and rounded to the nearest integer. To convert metric tonnes of carbon per pixel back to Mg CO2 acres-1, divide by 0.0606475, but note the small impact of rounding values for use in the RLMT.

For display in the RLMT, the metric tonnes per pixel values were converted to metric tonnes per acre by multiplying the pixel values by 4.496511. To convert metric tonnes per acre to metric tonnes CO2 per acre, multiply by 3.667.

The RLMT allows users to view total ecosystem carbon estimates for 2020 and 2070, and the polygon tool provides summaries of all four carbon pools for 2020 and 2070 in metric tonnes per forested acre and in metric tonnes of CO2 per acre. The NFCMS v3 data for all years (2020, 2050, and 2070) and for all carbon pools in Mg CO2 acres-1 can be downloaded from the following web site: https://www.fs.usda.gov/rds/archive/catalog/RDS-2025-0019.

Click here for more details about the NFCMS v3 methods.https://s3.us-east-1.amazonaws.com/osi-craft/pdfs/NFCMS-Guidance-Document.pdf

Citations

Goward, S. N., Huang, C., Zhao, F., Schleeweis, K., Rishmawi, K., Lindsey, M., et al. (2015). NACP NAFD Project: Forest Disturbance History from Landsat, 1986-2010. In: ORNL Distributed Active Archive Center.

Hasler, Natalia; Williams, Christopher A. 2025. National Forest Carbon Monitoring System (NFCMS) version 3.0 - Carbon stocks and potential sequestration over conterminous U.S. forests. Fort Collins, CO: Forest Service Research Data Archive. a

href='https://doi.org/10.2737/RDS-2025-0019' target='_blank'>https://doi.org/10.2737/RDS-2025-0019

Pengra, B. W., Stehman, S. V., Horton, J. A., Dockter, D. J., Schroeder, T. A., Yang, Z., et al. (2020). LCMAP Reference Data Product 1984-2018 land cover, land use and change process attributes (ver. 1.2, November 2021).

Williams, C.A., N. Hasler, H. Gu, and Y. Zhou. 2021. Forest Carbon Stocks and Fluxes from the NFCMS, Conterminous USA, 1990-2010. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1829

Zhao, F., Huang, C., Goward, S. N., Schleeweis, K., Rishmawi, K., Lindsey, M. A., et al. (2018). Development of Landsat-based annual US forest disturbance history maps (1986–2010) in support of the North American Carbon Program (NACP). Remote Sensing of Environment, 209, 312-326. https://www.sciencedirect.com/science/article/pii/S0034425718300476

Forest Carbon (2070)

The method used to calculate the 2070 carbon stocks was the same as described for the 2020 forest carbon stocks, except that the model assumed no disturbances to the forests after year 2020. Because the modeled forests grow undisturbed from 2020 onward, the results can be used to estimate the potential carbon sequestration if the forest were free of harvest, fire, or conversion. While conservation efforts can limit harvest and conversion, it is difficult to predict future disturbances and users should be aware that the actual sequestration may be less than predicted.

Note that there are some pixels where forest carbon could decrease from 2020 to 2070. This only occurs if there was a forest disturbance just prior to 2020.

Potential Carbon Sequestration (2020-2070)

The *Total Potential Sequestration* is estimated as: *(2070 stock - 2020 stock)*. The analysis tool also calculates the **Average Annual Sequestration Rate** per selected **site** *((2070 stock - 2020 stock)/50 years)* and per **acre** *((2070 stock-2020 stock)/50 years/acres)*. The potential sequestration layer in the map is displayed as metric tonnes / acre. The values in the carbon summary report for a polygon are reported in both metric tonnes and metric tonnes/acre/year.

Reforestation: This tool is not designed to identify places with the highest potential for reforestation to increase carbon sequestration. To address that question, check out www.ReforestationHub.org

Soil Carbon (mt/ac)

Estimates of soil organic carbon (SOC) for 0-30 cm topsoil layer at 250-m resolution for the conterminous USA (CONUS) are from Oak Ridge Lab (Guevara et al. 2020). The estimates are for the period 1991-2010 and were derived using the USDA Rapid Carbon Assessment (RaCA), which used over 6000 field soil samples and multiple environmental variables representative of the soil-forming environment coupled with a machine learning approach (i.e., simulated annealing) and regression tree ensemble modeling for optimized SOC prediction. Across the continental US, nearly 31% of SOC was found in forests, 28% in croplands, and 35% in grasslands and shrublands respectively.

Guevara, M., C.E. Arroyo-cruz, N. Brunsell, C.O. Cruz-gaistardo, G.M. Domke, J. Equihua, J. Etchevers, D.J. Hayes, T. Hengl, A. Ibelles, K. Johnson, B. de Jong, Z. Libohova, R. Llamas, L. Nave, J.L. Ornelas, F. Paz, R. Ressl, A. Schwartz, S. Wills, and R. Vargas. 2020. Soil Organic Carbon Estimates for 30-cm Depth, Mexico and Conterminous USA, 1991-2011. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1737

Current Land Cover Adjustments: For the Soil Carbon datasets, we used the 2023 National Land Cover Database (NLCD) to remove soil carbon pixels that occurred on open water and developed land (high, medium, and low intensity).

Total Carbon: Estimates for total carbon in the carbon calculator use Forest Carbon 2020 for all cells with forest cover and Soil Carbon 2010 for all cells with non-forest cover. To combine the two datasets, we resampled the SOC data to a 30-m resolution to align with our other data products. Please note that resampling to a higher 30-m resolution introduces false accuracy as the original SOC data was at a lower 250-m resolution.