ECOLOGICAL INVENTORY
OF
SELECTED TOWN LANDS IN WINDHAM, NH

prepared for

Windham Conservation Commission

prepared by

Moosewood Ecological

Innovative Conservation Solutions for New England

PO Box 9 - Chesterfield, NH 03443-009
(603) 831-1980
jeff@moosewoodecological.com
www.moosewoodecological.com

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STEVEN LAMONDE
Ecologist / Project Manager

JEFFRY LITTLETON
Principal Ecologist

JAIME McGUIGAN
Ecologist

with assistance from

LAURA DEMING
Wildlife Biologist

and

ARIANWEN JONES-LAMONDE
Herpetologist

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Cover photo: Beaver Brook flowing along the western boundary of Campbell Farm.

Introduction

At the request of the Town of Windham Conservation Commission, Moosewood Ecological LLC conducted biodiversity inventories at five sites of single or contiguous Town-owned properties. These were 1) Ashton Woods, 2) Campbell Farm, 3) the connected lands associated with Clyde Pond and Gage Lands, 4) Deer Leap, and 5) Foster's Pond. Overall, this project sought to provide the Windham Conservation Commission field-based data with which to make informed decisions related to conservation planning within the community. Our specific objectives included:

1. Develop site-specific, baseline data on biodiversity
2. Conduct surveys for wildlife and significant natural communities
3. Evaluate ecological integrity from multiple perspectives
4. Assess potential impacts to biodiversity from development and climate change
5. Provide recommendations to guide conservation planning efforts

Field surveys, spanning April through October, 2023, thoroughly documented species, habitats, natural communities, and other environmental features. Combined with various desktop analyses, our inventory efforts collected data on wildlife populations with a particular focus on species of conservation need and significant natural communities. 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 3.2 to locate natural features of particular interest. Datasets used for analysis, mapping, or otherwise complementing out sampling design included:

- United States Geological Survey topographic quadrangles
- National Hydrography Dataset
- National Wetlands Inventory Plus dataset
- New Hampshire Fish and Game Wildlife Action Plan
- New Hampshire Natural Heritage Bureau rare species and natural communities
- New Hampshire Conservation and Public Lands
- New Hampshire GRANIT digital parcel dataset for Rockingham County
- New Hampshire GRANIT LiDAR-derived digital elevation model

Additional data from community science databases, primarily eBird (www.ebird.org) and iNaturalist (www.inaturalist.org), assisted with filling in informational gaps where appropriate. Combined, all utilized datasets presented a well-rounded picture of the current ecological condition of the study area. While our surveys were thorough, this report only represents a single field season and some species likely escaped documentation. Within this report, we included scientific names at the first mention of each species or for clarification of taxonomic groups. Following taxonomic naming conventions, wildlife names were capitalized (e.g. Wood Frog) and

plant names were written in sentence-case with proper nouns capitalized (e.g., white oak). Regarding parcel measurements, all property acreages were calculated in ArcGIS Pro using the latest parcel data from NH GRANIT. Despite using the most recent GIS data available, the stated acreages in this report may differ slightly from each parcel's property card in the Windham Tax Assessor's database. All displayed photos were taken on-site by Moosewood Ecological staff.

Methods

Our ecological inventory adopted a holistic approach, focusing on more than cataloging species. To better understand why documented species could be found at each site, we viewed each property from multiple perspectives and at different temporal and spatial scales. The following sections provide conceptual definitions that outline our assessment framework as well as general information pertaining to Windham. We also described types of wildlife habitats among the five sites, as well the various inventory methods used by our team of ecologists and biologists in the field.

Current Ecological Condition

Each site's current ecological condition was described via five interconnected lenses. *Geologic setting* dictates a site's *topography and soils*, which influence the *natural communities* that grow there. In turn, types of natural communities support different assemblages of *wildlife*. Lastly, viewing a study area relative to the surrounding *landscape* offers insight helpful for evaluating habitat and wildlife connectivity.

Geologic Setting, Topography, and Soils

Knowledge regarding a site's geologic history leads to a deeper understanding of how major geographic components, including hills and valleys, formed over time to create the modern landscape. In turn, these features' topographic, physical, and chemical properties help shape local growing conditions. According to data from the United States Geological Survey, the bedrock underlying Windham consists mostly of metasedimentary and metavolcanic rocks associated with the Berwick Formation. This geologic formation stretches from southern Maine to central Massachusetts and is characterized mostly by granofels, or medium- to coarse-grained rocks that lack distinct foliation or lineation. Dominant minerals include biotite, quartz, and feldspar. Geologists estimate that Berwick Formation bedrock formed approximately 400- to 420-million years ago during the Silurian era.

Glaciation and the vast ice sheet that covered New Hampshire from approximately 60,000- to 14,000-years ago scoured the Berwick Formation bedrock and deposited fragments of all sizes in unsorted beds, called till. Geological surveys of the Windham topographic quadrangle mapped glacial till covering the majority of the town's uplands (Larson 1984). The till consists of light- to dark-gray, non-sorted to poorly-sorted mixture of clay, silt, pebbles, cobbles, and boulders.

Elsewhere, particularly within Windham's low-lying areas, surficial geology was highly influenced by glacial Lake Derry. This ancient lake spanned many square miles and deposited deep (20 to 30 feet) beds of silt, sand, and some gravel along modern-day Beaver Brook and its tributaries. The spillway of glacial Lake Derry was located approximately 1.3 miles south of the village of West Windham, and glacial stream deposits of sand and gravel are common downstream of this point in both Windham and Pelham. Glacial stream deposits are also associated with Golden Brook between Cobbetts Pond and Moeckel Pond. Other markers of historic glacial activity within Windham include glacial erratics, or large boulders deposited by moving ice.

In the thousands of years since the last ice age, natural processes of erosion weathered the landscape by breaking rocks into smaller particles and developing today's complex network of streams and rivers. Hills of varying sizes and shapes also characterize much of modern-day Windham. Across this rolling-hill topography, steep-sloped areas are associated with shallower and rockier soils, whereas flatter areas and depressions contain deeper soils with smaller-grained rock particles. Adding further diversity to the range of growing conditions is topographic aspect, or the compass direction that a slope faces. South-facing aspects receive more light, which increases air temperature and reduces moisture, whereas north-facing aspects can exhibit a cooler temperature, higher humidity, longer-duration snowpack, and increased soil moisture. Combined, slope and aspect contribute to form of microclimates, or small areas with a different air temperature and humidity values than the surrounding area. Landscapes with diverse microclimates tend to exhibit more biodiversity and offer greater resilience to climate change than more topographically uniform areas (Anderson et al., 2016).

In addition to topography, four other factors govern the formation of soil: parent material, climate, organisms, and time. The till-based parent material sourced from Berwick Formation bedrock, along with many of the bedrock types found in New Hampshire, typically produce acidic soils, or those with a pH below 7.0. Unlike easily-dissolvable bedrock types like limestone, the insolubility of granites and similar bedrock types withholds alkaline (pH > 7.0) nutrients from buffering acidic rain water, which has a normal pH of about 5.6 (NHDES 2019). Due to this general unavailability of alkaline-leaching parent material across much of New Hampshire, most native plants are well-adapted to acidic soils. Where pockets of nutrient-leaching bedrock occur, nutrient-rich soils can form. Nutrient enrichment can also occur when decaying organic material or nutrients from other sources are concentrated at the base of steep slopes or in drainages. These uncommon, enriched sites are often associated with many of New Hampshire's threatened and endangered plants.

Climate influences soil's chemical and physical properties by determining the type and degree of natural weathering processes. The National Oceanic and Atmospheric Administration's meteorological station near Massabesic Lake collects daily weather information for New

Hampshire's Merrimack Valley physiographic region, and scientists use these data to calculate climate averages and trends. For the thirty-year period between 1991 and 2020, this region experienced a mean maximum summer temperature of 80.1°F and a mean minimum winter temperature of 14.4°F (Lemcke-Stempone et al. 2022). Annual precipitation averaged 42.0 inches and extreme precipitation events, or days with more than one inch of rainfall, averaged 9.6 days per year.

These regional climate conditions help create and maintain generally moist, frost-tolerant soils that host well-adapted soil organisms. In turn, soil-dependent plants, animals, and fungi contribute to the formation of soil by adding organic matter, physical mixing (e.g., burrowing), and cycling nutrients and moisture. As these processes take place over time, soil depth typically increases. Deep, healthy soils provide a number of critical ecological services: filtering and cleaning water, storing and regulating water flow, recycling nutrients, storing carbon dioxide, and providing suitable growing conditions and habitat for many plants, wildlife, and fungi.

When it comes to mapping soil types, the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) maintains the premier soil survey data for the nation. The NRCS's process for delineating soil types combines field surveys with digital assessments of slope, landform, and climate data to map soil types at a scale of 1:20,000. Many of the maps in this report are drawn at a finer scale, thus one must apply caution when interpreting soils from maps zoomed in beyond the intended scale. The displayed boundaries between soil types more likely represent variable-width transition zones where the physical and chemical properties of soil shift in response to environmental factors.

Natural Communities

Natural communities are assemblages of plants, their physical environments, 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 zines, 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.

Each of Windham's five natural areas studied by this report was assessed for rare or 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 a S1 rank indicates a critically imperiled community at high risk of loss.

Invasive Species

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 practices. 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 (*Castanea dentata*) and elms (*Ulmus spp.*). Currently, New Hampshire faces many other pathogens that harm our forests, including Emerald Ash Borer (*Agrilus planipennis*), beech bark disease (*Cryptococcus fagisuga + Neonectria faginata*), and Hemlock Woolly Adelgid (*Adelges tsugae*).

Ecologically Significant Wildlife Habitats

The New Hampshire Fish and Game Department, in cooperation with other agencies, organizations, and individuals, produced the first New Hampshire Wildlife Action Plan (WAP) in 2005. The latest revision of this plan was produced in 2015, while updates to state-wide habitat data occur every five years. The WAP serves as an important planning and educational tool to promote the conservation and management of New Hampshire's biological diversity. As such, the reports and their associated data are well-used by federal, state, and municipal governing bodies, conservation commissions, land trusts and other conservation organizations, natural resource professionals, and private landowners. The WAP provides a resource for developing informed land use decisions and land management planning, with the intent of ensuring that an adequate representation of various wildlife habitats is maintained across New

Hampshire's landscape, keeping common species common and working to prevent the loss of our rare and endangered species.

As part of the WAP, New Hampshire Fish and Game categorized 28 general habitat types for the State through an iterative process that combined complex modeling, existing datasets, and known plant communities, geology, soils, and hydrology. Of the habitat types identified in New Hampshire as part of the WAP, nine occur at least one of the five study areas in Windham.

Appalachian Oak - Pine Forest

Statewide, only 12% of upland area consists of Appalachian oak-pine forests and conserved lands protect roughly 17% of this habitat type. While Appalachian oak-pine forests occur predominantly in New Hampshire's coastal plain, isolated patches exist north of Lake Winnipesaukee on dry rocky ridges or sand plains with a historic fire regime. The sandy, often rocky, soils in this habitat are typically nutrient-poor and dry or moderately-moist, which trends more towards pine barrens habitat when wildfires occur frequently. In this setting southern hardwoods and pines dominate the canopy, including white oak (*Quercus alba*), black oak (*Quercus velutina*), chestnut oak (*Quercus montana*), hickories (*Carya* spp.), and pitch pine (*Pinus rigida*). Such an abundance of nut-producing trees attracts a diversity of wildlife, which supports a well-functioning ecosystem in undisturbed landscapes, and mature forests offer nesting sites for raptors and denning holes for mammals. In New Hampshire, Appalachian oak-pine habitat hosts 104 vertebrate species, including eight amphibians, 67 birds, 17 mammals and 12 reptiles.

Developed Lands

While developed landscapes (e.g., 'developed impervious,' 'developed or barren land') may not conjure images of wildlife habitat, these human-manipulated landscapes offer resources to many adaptable species, from non-native House Sparrows (*Passer domesticus*) to native Common Eastern Bumblebees (*Bombus impatiens*) and even such state-threatened birds as Common Nighthawks (*Chordeiles minor*), Peregrine Falcons (*Falco peregrinus*), and Chimney Swifts (*Chaetura pelagica*). Primarily representing residential and commercial settings, developed habitat types include numerous associated features: roadways, road shoulders, manicured lawns, maintained gardens, buildings, and town and city centers.

Floodplain Forest

Floodplains are found along river valleys directly adjacent to rivers, streams, and larger wetland complexes, including Windham's Beaver Brook. They can vary in their species composition and overall structure from forests to open herbaceous floodplains with shrub swamps, oxbows, and vernal pools. They are strongly influenced by the size of the watershed and the gradient of the river. Historically, many of New Hampshire's floodplains were cleared for agricultural fields in

the 1700s-1800s. Many have now been converted into residential, commercial, and industrial developments, while others remain as farmlands. As a result, floodplains are more limited due to these types of land conversion, as well as construction of dams that control water levels. Floodplains and riparian forests play critical roles in helping to protect water quality by slowing floodwaters and supporting diverse plant communities. They also provide significant habitat for a wide variety of wildlife including several species of greatest conservation need, such as Wood Turtle (*Glyptemys insculpta*), Blanding's Turtle (*Emydoidea blandingii*), Spotted Turtle (*Clemmys guttata*), Smooth Green Snake (*Opheodrys vernalis*), Northern Leopard Frog (*Lithobates pipiens*), Veery (*Catharus fuscescens*), and American Woodcock (*Scolopax minor*), as well as providing important wildlife corridors.

Grassland

Grasslands represent non-forested areas maintained for a variety of uses, such as hay, pastures, and wildlife habitat. Grasses, sedges, wildflowers, and other herbaceous plants dominate this habitat, with few or no trees present. Grasslands were more abundant during the late 1700s through the mid-1800s before thousands of farmers abandoned their lands in favor of more fertile soil in the Midwest or industrial jobs in cites. During this transitional period, cleared agricultural lands slowly revegetated and reverted to forest. As such, there has been a steep decline in the diversity of wildlife associated with grassland habitat, particularly those species that require many contiguous areas of uninterrupted grasses for breeding (e.g., Bobolink – *Dolichonyx oryzivorus*, Upland Sandpiper – *Bartramia longicauda*, Grassland Sparrow – *Ammodramus savannarum*). However, numerous species still benefit from small, even isolated grasslands including foraging ungulates, nesting turtles, and pollinating insects. According to the WAP, only 8% of grasslands in New Hampshire are protected with conservation easements.

Hemlock – Hardwood – Pine Forest

New Hampshire's most-abundant habitat type, hemlock-hardwood-pine forests cover nearly half of the State's upland area. While, comprised primarily of eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), American beech (*Fagus grandifolia*), and oak (*Quercus* spp.) trees, this forest occurs across a wide variety of soils and topography, which produce hemlock – hardwood – pine forests with quite different ratios of the dominant trees. In southern New Hampshire, this habitat type transitions into Appalachian oak – pine forest. Further north, or at higher elevations, hemlock – hardwood – pine forest shifts to northern hardwood – conifer forest habitat. Due to its widespread distribution and important role as a buffer protecting uncommon habitat types, hemlock-hardwood-pine forests provide significant habitat, food, shelter, and other resources for an estimated 140 vertebrate species in New Hampshire. This extensive list includes 15 amphibian species, 73 birds, 39 mammals, and 13 reptiles.

Marsh and Shrub Wetlands

Habitat categorized as marsh and shrub wetlands encompass three groups of wetlands that all exhibit wet soils during above-freezing months of the year. Wet meadows consist primarily of grasses and sedges, emergent marshes contain aquatic plants such as cattails and water lilies, and scrub-shrub wetlands support shrubs and young trees growing out of wet soils. These wetland types often form following the departure of beavers from a pond or in areas with suitable groundwater levels. Wetlands provide a wealth of ecological functions from filtering pollutants, containing floodwater, cycling nutrients, and even moderating impacts of climate change; they are also controlled by groundwater levels. Furthermore, wetlands that exhibit characteristics of multiple wetland sub-types correlate strongly with exceptional biodiversity. Marsh and shrub wetlands cover approximately 3%, or 154,000 acres, of New Hampshire's landscape, of which conservation easements cover an estimated 27%. This habitat plays a critical role in supporting over 100 vertebrate species in New Hampshire, including 18 species of conservation concern that depend on wetlands for foraging, nesting, breeding, and shelter.

Open Water

Within New Hampshire, lakes and larger ponds provide significant recreational opportunities for many people and support numerous aquatic wildlife and plants. Amphibians, aquatic reptiles, waterfowl, and such raptor species as Bald Eagle (*Haliaeetus leucocephalus*) and Osprey (*Pandion haliaetus*) all depend on open water for at least one part of their life cycle. In addition, this habitat contains countless aquatic plants, macroinvertebrates, zooplankton, phytoplankton, and naturally-occurring bacteria that create the foundation of a healthy food web. The WAP's open water habitat designation includes both cold-water and warm-water lakes and ponds, each of which support characteristic assemblages of fish and aquatic plants depending on water depth and nutrient levels.

Rivers and Streams

As with open water habitats, aquatic networks of rivers and streams provide critical habitat for many aquatic and amphibious organisms, as well as generate food and other resources for numerous terrestrial animals. Unlike lakes and ponds, rivers and streams host numerous riverine specialists, from certain fish and salamanders to various caddisflies, stoneflies, damselflies, and dragonflies. Many of these species thrive within a particular range of water temperature or nutrient levels, and changes in a stream's species assemblage often indicates an alteration of the ecological condition. For example, the climate-induced warming of rivers in the Northeast has led to reduced Eastern Brook Trout (*Salvelinus fontinalis*) populations (Sneddon and Hammerson, 2014), while restoration efforts to mitigate excess human-impacted streams have spawned the return of certain macroinvertebrates (Braccia et al., 2023).

Temperate Swamp

Characteristics of temperate swamps vary depending on hydrology, water chemistry, and vegetation composition, yet all exhibit forested structure, unlike marsh and shrub wetlands. Forested wetlands often form in isolated, low-lying basins where groundwater levels can maintain saturated, organic soils. Red maple (*Acer rubrum*) and eastern hemlock often dominate the overstory, while ferns and shrubs like northern highbush blueberry (*Vaccinium corymbosum*) and winterberry (*Ilex verticillata*) frequently occur in the midstory or understory. Ferns, particularly cinnamon fern (*Osmundastrum cinnamomeum*), and sphagnum mosses (*Sphagnum* spp.) also commonly occur in this habitat type. When water levels are deep enough, including in small hollows created by upturned trees, temperate swamps can function as breeding sites for vernal pool species. These forested swamps cover approximately 92,000 acres mostly in southern and central New Hampshire, and conservation easements protect about 22% of this habitat type.

Vernal Pools

Vernal pools provide distinctive and critical habitats for a variety of species. The WAP recognizes vernal pools as unique wetlands that provide crucial breeding habitat for several amphibian species of greatest conservation need in New Hampshire; however, these isolated wetlands have not been mapped for New Hampshire. Pools typically fill during the spring, dry out completely or partially later in the summer, and, importantly, lack viable fish populations. These attributes are critical for the long-term survival of vernal pool obligate organisms. Traditional vernal pools also lack permanent inlet or outlet streams, thereby depending entirely on rainwater and snowmelt. Obligatory vernal pool wildlife often opportunistically lay eggs within forested and shrub wetlands that contain water year-round. For vernal pools to continue to function as critical wildlife habitats, they require a forested canopy around the vernal pool and significant intact, natural forest surrounding them, as many obligate species spend most of their life cycles up to 1,000 feet from the vernal pool in these forested uplands.

Amphibians such as Wood Frog (*Lithobates sylvaticus*), Spotted Salamander (*Ambystoma maculatum*), and Jefferson Salamander (*Ambystoma jeffersonianum*), a species of special concern, breed in vernal pools in New Hampshire. Vernal pools are also significant for other vertebrates of conservation concern including Blanding's Turtle, Spotted Turtle, and Eastern Ribbon Snake (*Thamnophis sauritus*). Many aquatic macroinvertebrates such as fairy shrimp and fingernail clams depend upon this habitat as well. Examples of both true vernal pools and isolated, fish-free wetlands utilized by vernal pool species are present at Ashton Woods, Campbell Farm, Clyde Pond and Gage Lands, Deer Leap, and Foster's Pond.

Wildlife Inventory

Of 58 potentially-occurring wildlife species of greatest conservation need in Windham according to the Wildlife Action Plan (New Hampshire Fish and Game, 2020; see Appendix II), 50 exhibit

associations with the habitats located among the five study areas. Moosewood Ecological's scope of work did not include survey efforts for mussels, fish, and bats; hence, our surveys focused on 32 species of greatest conservation need. While species of greatest conservation need were the primary focus of field surveys, all observed species were recorded to build a preliminary biodiversity list for each site.

To capture wildlife use of the property throughout all four seasons, field surveys took place during peak biodiversity season of 2023. Springtime surveys for vernal pools, spring ephemeral wildflowers, and basking turtles gave way to surveys for breeding birds in early summer. Camera trapping efforts, which focused on recording the presence and movements of large animals, took place throughout most snow-free months of the field season. Moosewood Ecological recorded locations of significant observations with handheld GPS units, while casual observations of non-focal wildlife were photographed and georeferenced using a time-synchronized GPS track.

Amphibian Surveys

Amphibian survey methodologies largely depended on visual encounter surveys, 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.

Bird Surveys

Two rounds of breeding bird surveys took place at each property between June and July, 2023, when all local breeding bird species were expected to have returned from spring migration and before songbirds quieted down in late summer. Sampling occurred within earshot of all habitat available types, and 15 point-count stations were spaced at least 500 feet apart (average 700 feet) to reduce double-counting of individual birds. Each site contained between five (Ashton Woods) and eleven (Gage Lands complex) point-count stations. To maximize detection of breeding songbirds, these surveys took place on calm mornings with no precipitation and ended no later than three hours after sunrise. Each survey visited all 15 point-count stations, where all birds confidently identified by sight or sound during a 10-minute observation window were recorded. In addition to these standardized surveys, most birds detected during non-avian surveys or other site visits were incidentally noted.

Mammal Surveys

Two primary methodologies were employed to survey mammals at the five town-owned study areas. Starting in May and ending in October, four motion-sensing camera traps were rotated between eight locations to document wildlife, especially large and medium-sized mammals as they moved throughout the properties. Collectively, the eight camera trap locations sampled a diversity of habitat types and features, from upland forests and shrublands to riparian edges and

recreation trails. Complementing the camera trap data were opportunistic observations of mammals during site visits throughout the study period. Observations included sight, sound, tracks, scat, or browse sign.

Reptile Surveys

To inventory reptilian species populating the focal properties, Moosewood Ecological employed a series of repeat, direct searches of 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 of cover objects, walking transects, and stationary observation.

Invertebrate Surveys

While no standardized or targeted surveys were conducted for invertebrates as part of this inventory, it was hard not to document these often photogenic and poorly-studied creatures. Numerous pollinators, among other insects, were photographed and these observations significantly contributed to each site's overall biodiversity.

Results

Past land use history has helped shape the current conditions at each of the five sites assessed. All properties include various signs of agriculture dating back to the mid to late 1700s through the 1800s. Stonewalls are common, separating livestock pastures from one another or to prevent incursion of livestock within the cultivated lands used for food production. Previously cultivated areas within the forests are evidenced by piles of small, fist-sized stones and flat topography. Good examples of this past land use by early colonists can be observed at Campbell Farm. An old cellar hole is present along the trail at Deer Leap where cultivation had also occurred.

The majority of agricultural activities appear to have been abandoned in the late 1800s to early 1900s. Once abandoned, second-growth forests established with multiple logging events having occurred over the past century. One can see evidence of logging by way of cut stumps from hardwoods and softwoods, as well as the multiple-trunked hardwoods such as oaks, maples, and ash trees. The intense land use associated with past agriculture followed by various logging activities has impacted soil conditions and overall plant composition on each property. These events have produced the forests we see today, which creates a challenge when identifying upland forest communities.

The following sections provide accounts of our site assessments for each property. Here, we have attempted to capture the significant findings in terms of wildlife, habitats, natural communities, and invasive species. Incidental observations of rare plants have been included. The assessments represent a snapshot of the biodiversity, and do not replace more comprehensive surveys. As such, many additional species are expected to occur.

Ashton Woods

Parcel: 14-B-3450
GIS-calculated area: 36.9 acres


Ashton Woods' primary stream.

Covering approximately 37 acres, the Ashton Woods conservation area surrounds the Ashton Park Road development and contains a mixture of wetlands and forested upland. Several trails traverse the property and are accessible from Castle Hill Road and Ashton Park Road. Over the course of this study, we frequently observed people using the trails for walking, nature enjoyment, family hikes, and mountain biking. A long stone wall and numerous multiple-stemmed hardwood trees point to historic sheep farming and logging activities at Ashton Woods.

Geologic Setting, Topography, and Soils

As with most of Windham, Ashton Woods rests on top of Berwick Formation bedrock covered by a modest layer of glacial till (Table 1). The surficial geology map for the Windham quadrangle marks Ashton Woods' wetland as swamp deposits, which formed over hundreds to thousands of years post-glaciation. Topographically, the property largely occupies the eastern slope of an unnamed pond situated on a watershed divide. This pond primarily feeds a stream that flows southwest, eventually meeting up with Beaver Brook. When the pond experiences high water levels, excess water flows through a separate drainage to the northeast that feeds Clyde Pond. Elevation ranges from a high of about 390 feet on the eastern side of Aston Park Road to a low of about 290 feet where the intermittent stream exits the northern property boundary. Most soil types at Ashton Woods are well drained except for the Scarboro muck and Scituate-Newfields complex types associated with the main wetland (Table 2).

Table 1. Geologic characteristics of Ashton Woods.

Bedrock geology	Berwick Formation (Silurian) - metasedimentary and metavolcanic rocks of the Merrimack Trough.
Surficial geology	Till (Pleistocene) - light- to dark-gray, non-sorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; contains some gravel. Swamp deposits (Holocene) - muck, peat, silt, and sand. Generally 5 to 10 feet thick, but may be as much as 20 feet thick.

Table 2. Soil types and drainage classes for Ashton Woods.

Soil Type	Acres	Drainage Class
Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	5.2	Well drained
Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, rocky	3.3	Well drained
Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	11.8	Well drained
Hollis-Rock outcrop-Chatfield complex, 15 to 60 percent slopes	6.2	Well drained
Scarboro muck, very stony	1.2	Very poorly drained
Scituate-Newfields complex, 3 to 8 percent slopes, very stony	9.2	Moderately well drained

Natural Communities

Ashton Woods contains a mixture of upland and wetland natural communities. The uplands are dominated by dry Appalachian oak forest (S3) containing a mixture of northern red, eastern white, and black oaks as well as shagbark hickory (*Carya ovata*), eastern white pine, and hophornbeam (*Ostrya virginiana*). Small enriched patches also include basswood (*Tilia americana*) and white ash (*Fraxinus americana*) in low abundance. The shrub layer is dominated by lowbush blueberry (*Vaccinium angustifolium*) and black huckleberry (*Gaylussacia baccata*) with witch-hazel (*Hamamelis virginiana*) and mapleleaf viburnum (*Viburnum acerifolium*). Rare herbaceous species are known to occur within this forest community on various sites in the state. This forest community is considered vulnerable state-wide due to its limited distribution, being mostly confined to the southern part of New Hampshire. Small pockets of hemlock-beech-oak-pine may also be present.

Roughly 35% of Ashton Woods is associated with a complex drainage marsh-shrub swamp wetland ecosystem with slight acidic conditions. The surrounding densely developed landscape most likely has altered the plant species and soil chemical composition, owing to the complex web of natural communities. To a lesser degree, beavers have played a historic role in shaping this wetland.

The majority of this wetland is dominated by various shrubs and small red maple trees typical of the mixed tall graminoid - scrub-shrub marsh. Seasonally flooded red maple swamp can be found along portions of the wetland edge. This wetland complex is interspersed with various emergent marsh communities and aquatic beds. The entire wetland complex plays multiple significant roles, such as wildlife habitat, flood storage, water quality maintenance, and supporting rare species as well as carbon storage. Among the observed natural communities, we incidentally noted 90 plant species, among them the beautifully fragrant and somewhat uncommon swamp azalea (*Rhododendron viscosum*).

Table 3. Noteworthy plants observed at Ashton Woods.

Species	**Noteworthiness**
American hophornbeam (*Ostrya virginiana*)	Semi-enriched soil indicator
Basswood (*Tilia americana*)	Semi-enriched soil indicator
Black oak (*Quercus velutina*)	High wildlife value
Mapleleaf viburnum (*Viburnum acerifolium*)	High wildlife value
Mountain holly (*Ilex mucronata*)	High wildlife value
White oak (*Quercus alba*)	High wildlife value
Glossy buckthorn (*Frangula alnus*)	Invasive
Autumn olive (*Elaeagnus umbellata*)	Invasive
Japanese barberry (*Berberis thunbergii*)	Invasive
Multiflora rose (*Rosa multiflora*)	Invasive
Winged euonymus (*Euonymus alatus*)	Invasive

Wildlife and Habitats

Eastern Ribbon Snake.

Within the setting of dry Appalachian oak forest uplands and a dense scrub-shrub wetland, Ashton Woods hosts over 200 wildlife species among seven Wildlife Action Plan habitat types mapped within the property (Table 4). This list includes two reptiles of conservation concern that utilize Ashton Woods' diverse wetlands. Six confirmed vernal pools provide critical breeding sites for Spotted Salamanders, Wood Frogs, and fairy shrimp – three species that depend in these fishless waterbodies for reproduction. Three other woodland pools were classified as potential vernal pools. Our surveys documented 49 bird species at Ashton Woods, eight of which fall on at least one list of conservation priorities (Table 5). Other notable avian observations include nesting Red-shouldered Hawks (*Buteo lineatus*) and migrating Blue-winged Teal (*Spatula discors*).

Table 4. Wildlife Action Plan habitat types at Ashton Woods.

WAP Habitat Type	**Acres**	**Percentage**
Appalachian oak-pine forest	19.3	52%
Developed Impervious	0.2	<1%
Developed or Barren land	0.2	<1%
Hemlock-hardwood-pine forest	4.3	12%
Open water	1.8	5%
Temperate swamp	8.3	23%
Wet meadow/shrub wetland	2.7	7%

During the camera trapping portion of this study, we observed Bobcats (*Lynx rufus*) frequently passing through Ashton Woods. One of few wide-ranging carnivores in New Hampshire, Bobcats live in diverse habitats from wetlands to mountain slopes, often favoring dense vegetation and rocky areas for cover. This species typically maintains a territory spanning 12 to 36 square miles depending on habitat quality, thus habitat fragmentation forces these species to travel even farther to find adequate food and other resources. Where bobcats persist, they keep prey populations in check and help maintain high levels of biodiversity. Other notable mammals detected at Ashton Woods include American Beaver (*Castor canadensis*) and Short-tailed Weasel (*Mustela erminea*).

American Beaver.

Table 5. Summary of vertebrate species observed at Ashton Woods. SGCN = Species of Greatest Conservation Need (WAP, 2020).

Observed amphibian species	American Bullfrog, Eastern Red-backed Salamander, Gray Treefrog, Green Frog, Pickerel Frog, Spotted Salamander, Spring Peeper, Wood Frog
Vernal pool obligates	Spotted Salamander, Wood Frog, Fairy Shrimp
Amphibian SGCN	None detected
Observed bird species ***See Appendix I for full list***	49
Bird species of conservation concern	Wood Duck[1], Bald Eagle[1,2,4], Northern Flicker[1], Eastern Wood-Pewee[1], Barn Swallow[1], Brown Creeper[1], Common Grackle[3], Ovenbird[1]
Observed mammal species	American Beaver, Bobcat, Common Raccoon, Coyote, Eastern Chipmunk, Eastern Cottontail, Eastern Gray Squirrel, Groundhog, Muskrat, Red Fox, Red Squirrel, Short-tailed Weasel, Virginia Opossum, White-tailed Deer
Area-sensitive mammal species	Bobcat
Mammal SGCN	None detected
Observed reptile species	Common Garter Snake, Eastern Ribbon Snake, Painted Turtle, Ring-necked Snake, and one rare species
Reptile SGCN	Two species

Bird Conservation Plans

1. Bird Conservation Region 14 (2006)
2. New Hampshire Wildlife Action Plan (2015)
3. Partners in Flight (2016)
4. New Hampshire Audubon (2020)
5. North American Bird Conservation Initiative (2022)

In addition to the many vertebrates documented at Ashton Woods during this study, we also observed over 120 invertebrate species, including many moths and beetles. Three species represented first publicly-documented observations of that species in Rockingham County (Table 6). This may suggest rarity, but more likely indicates a lacking public interest in smaller insects.

Table 6. Noteworthy invertebrates observed at Ashton Woods.

Species Name	**Significance**
Witch-hazel Olethreutes (*Olethreutes hamameliana*)	One of three known sites in New Hampshire
Belostoma flumineum	First public record for Rockingham County
Woods Predaceous Diving Beetle (*Acilius semisulcatus*)	Third public record for New Hampshire
Band-winged Crane Fly (*Epiphragma fasciapenne*)	First public record for Rockingham County
Liriomyza smilacinae	First public record for Rockingham County

Selected photos (left to right): Autumn olive, mountain holly, and mapleleaf viburnum.

Left to right: Wood Duck, Spotted Salamander, and Witch-hazel Olethreutes.

Left to right: Woods Predaceous Diving Beetle, Band-winged Crane Fly, and *Liriomyza smilacinae*.

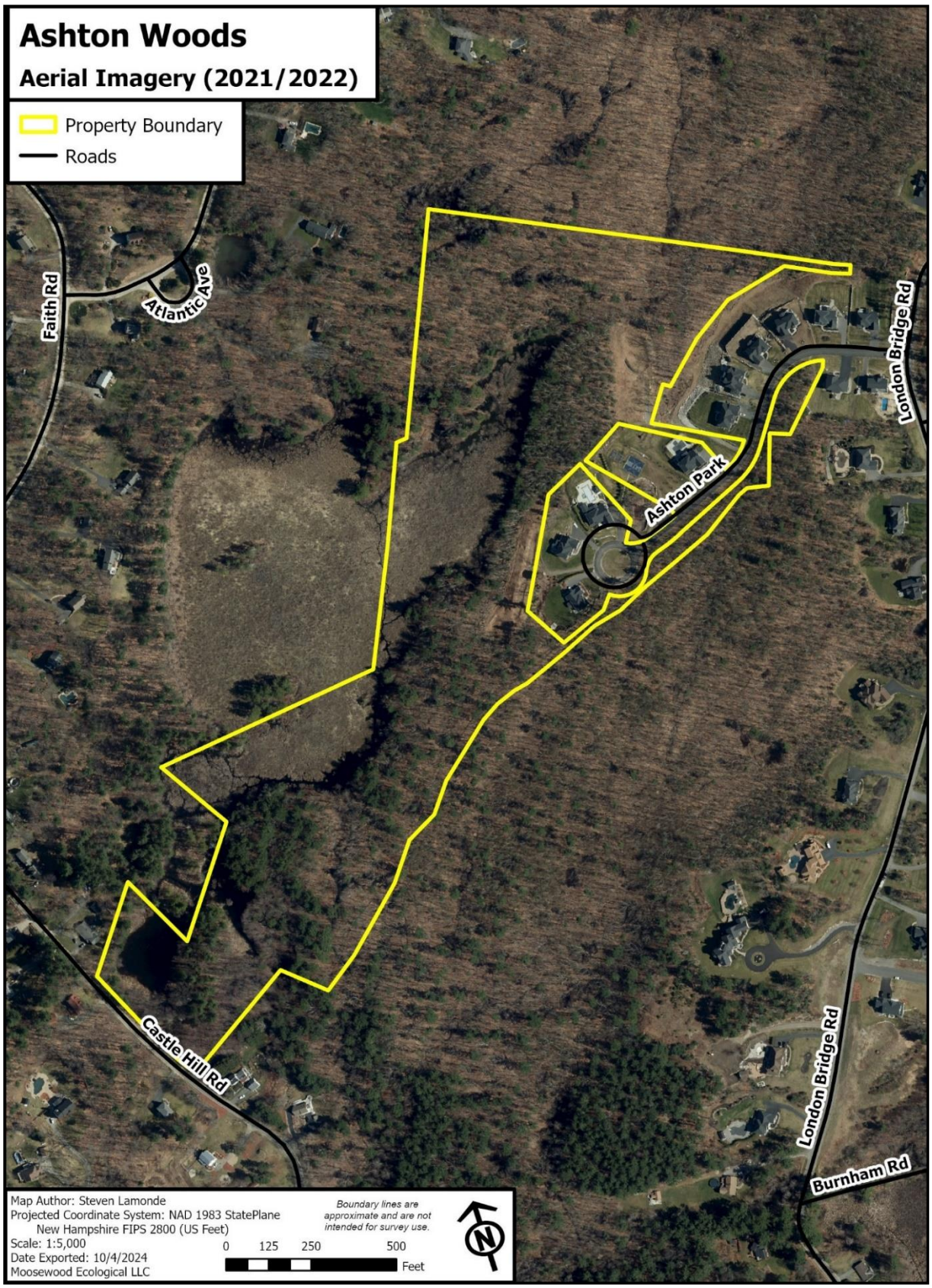

Figure 1. Aerial imagery map of Ashton Woods showing a mixture of hardwood and softwoods.

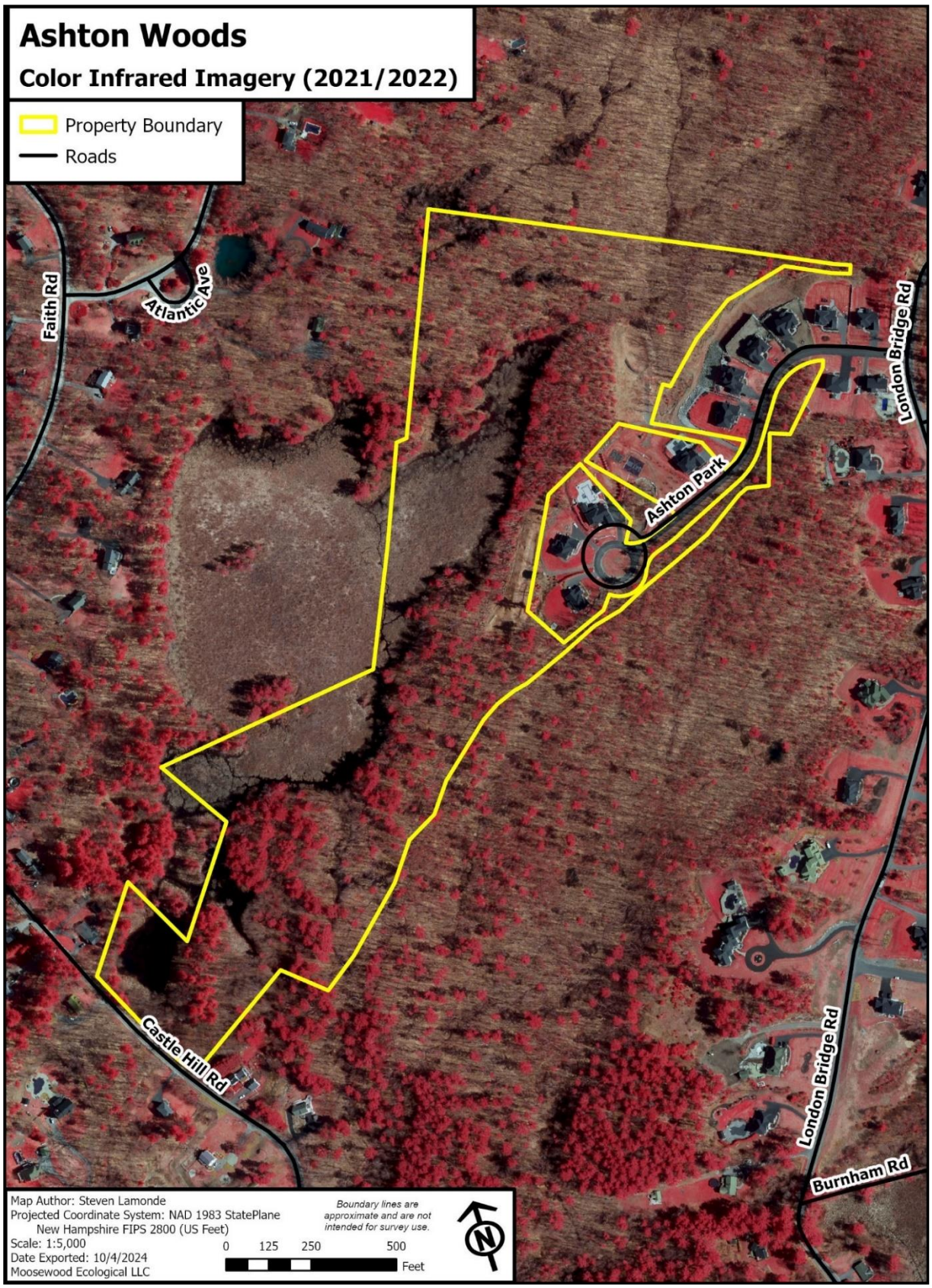

Figure 2. Color infrared imagery depicting shrub wetland and open water at Ashton Woods.

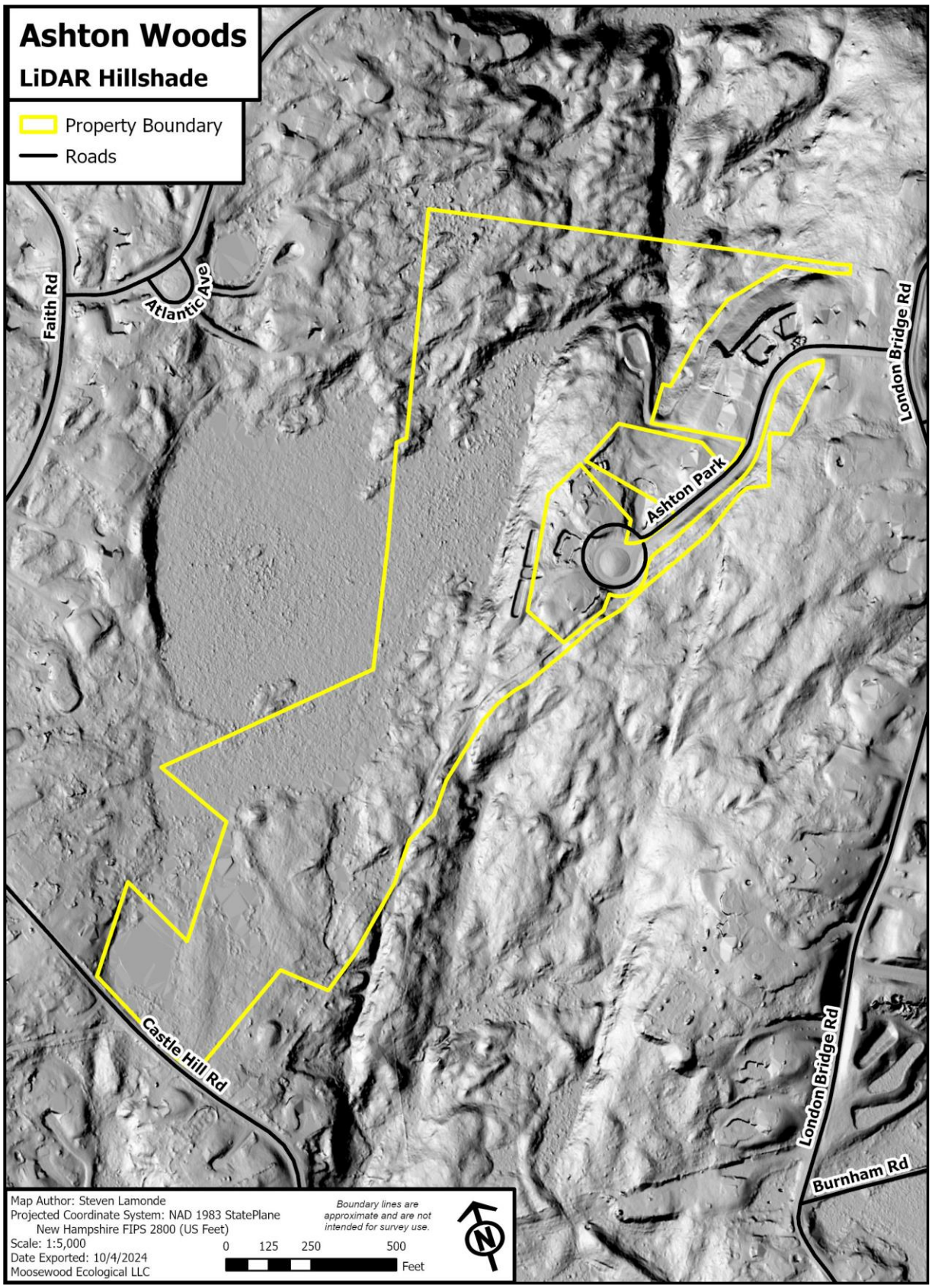

Figure 3. LiDAR hillshade model of Ashton Woods displaying a varied microtopography.

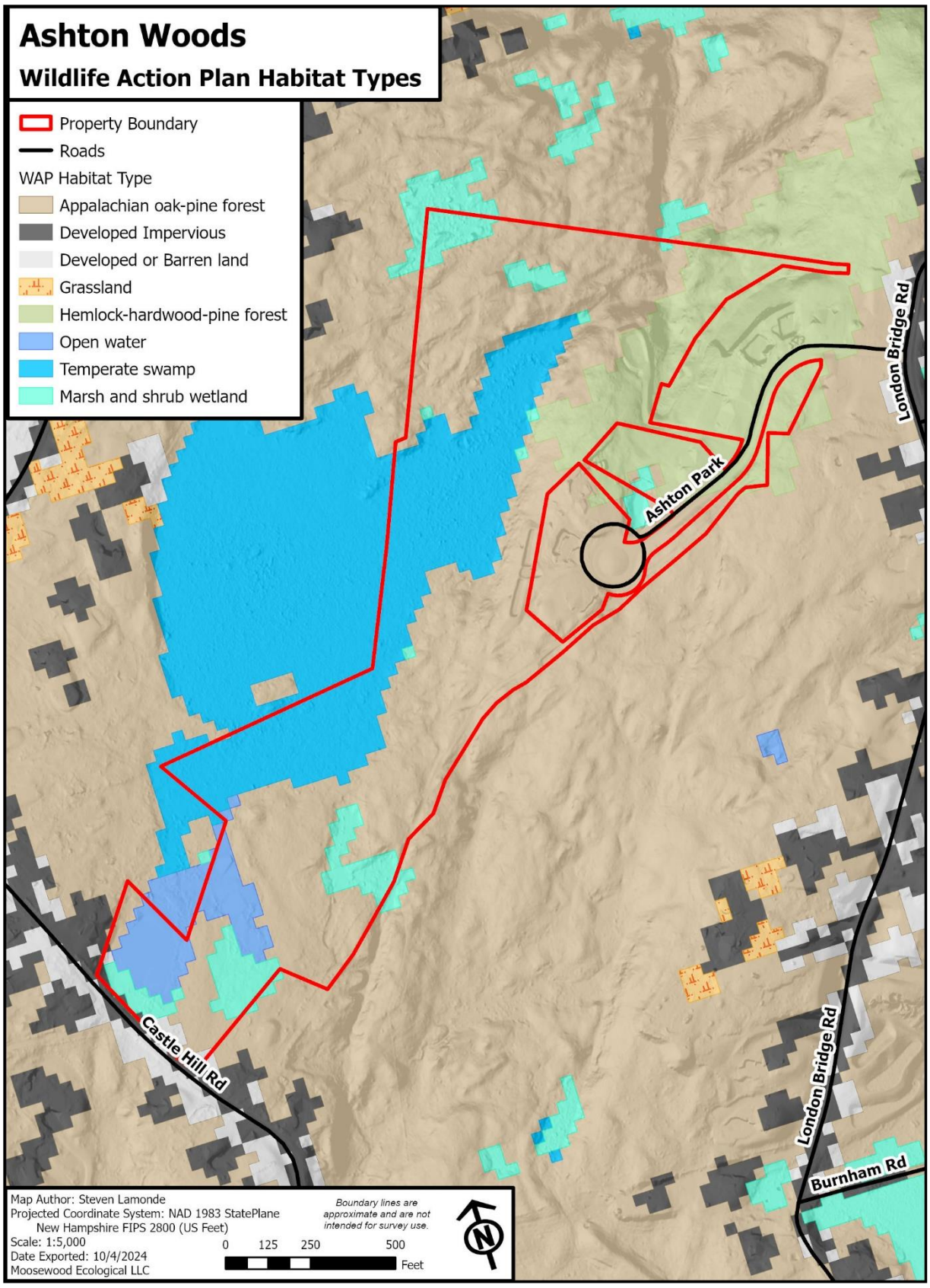

Figure 4. Ashton Woods' four major habitat types support a range of wildlife.

Campbell Farm

Parcel: 1-C-100
GIS-calculated area: 60.6 acres


Campbell Farm's large hay field.

Located along Kendall Pond Road within the northwestern corner of Windham, the Campbell Farm conservation area protects a sensitive riparian area along Beaver Brook, which forms part of the Town's boundary with Londonderry. Other significant ecological features at this property include a large hayfield, floodplain forest habitat, and an impressive glacial esker that forms a steep embankment parallel to Beaver Brook. This site is accessible from a dirt parking area off Kendall Pond Road. While no trails are currently maintained at the property, the hayfield and forests are accessible without much bushwhacking.

Geologic Setting, Topography, and Soils

Of the five study areas covered by this report, Campbell Farm boasts the greatest variety of surficial geology, from glacial-era deposits to swamp deposits that formed sometime in the last 11,000 years to till and various deposit types (Table 7). The parent material types available at this site significantly contribute to its diversity of habitats, wildlife, and plants. The property's highest point is located at the southernmost intersection with Kendall Pond Road, and Campbell's Farm lowest point of 205 feet is where Beaver Brook exits the property at the southwestern corner. The soils at this site are heavily influenced by glacial Lake Derry, and two soil types, the Lim-Pootatuck complex and Canton gravelly fine sandy loam, do not occur on any of the four other focal properties. Most of the property consists of well drained or excessively drained soils, although drainage rates decrease as one gets closer to Beaver Brook and its associated floodplains (Table 8).

Table 7. Geologic characteristics of Campbell Farm.

Bedrock geology	Berwick Formation (Silurian) – metasedimentary and metavolcanic rocks of the Merrimack Trough.
Surficial geology	Till (Pleistocene) – light- to dark-gray, non-sorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; contains some gravel. Glacial stream deposits (Pleistocene) – sand, gravel, and minor silt laid down by glacial streams during successive south to north ice positions. Generally less than 60 feet thick. Swamp deposits (Holocene) – muck, peat, silt, and sand. Generally 5 to 10 feet thick, but may be as much as 20 feet thick. Glacial Lake Derry Deposits (Pleistocene) – chiefly lake-bottom deposits consisting of silt and sand.

Table 8. Soil types and drainage classes for Campbell Farm.

Soil Type	Acres	Drainage Class
Canton fine sandy loam, 8 to 15 percent slopes, very stony	8.1	Well drained
Canton gravelly fine sandy loam, 15 to 25 percent slopes	0.4	Well drained
Hinckley loamy sand, 3 to 8 percent slopes	7.6	Excessively drained
Hinckley loamy sand, 8 to 15 percent slopes	20.5	Excessively drained
Lim-Pootatuck complex	1.5	Poorly drained
Scituate-Newfields complex, 3 to 8 percent slopes	10.9	Moderately well drained
Swansea mucky peat, 0 to 2 percent slopes	11.7	Very poorly drained

Natural Communities

The Campbell Farm property features part of an extensive drainage marsh-shrub swamp wetland system associated within the greater floodplain of Beaver Brook. Natural communities include examples of emergent marsh, cat-tail marsh, aquatic beds, and mixed tall graminoid – scrub-shrub marsh. Wetland communities associated with this ecosystem are fairly common throughout New Hampshire.

The upland forests are most closely aligned with dry Appalachian oak forests found in this part of the state and throughout Windham. Oaks (northern red, eastern white, black, and scarlet oak) and hickories (shagbark and pignut hickory) constitute the majority of hardwoods while eastern white pine is currently playing a dominant role on the sandy, dry esker and floodplains. While eastern white pine is well-adapted to the dry, sandy soils, at Campbell Farm they are most likely present in greater abundance due to the abandonment of past agricultural land uses, providing the perfect conditions for old-field white pines to establish quickly after farming was abandoned. An exemplary swamp white oak (*Quercus bicolor*) floodplain forest has been identified along Beaver Brook within one mile of Campbell Farm. Overtime, the floodplain forests in the southern part of the property may succeed into this rare natural community. In addition, small pockets of soil enrichment were observed by the presence of basswood and a few herbaceous plants including a state-endangered species, rue anemone (*Thalictrum thalictroides*) (Table 9). Some 97 plant species were incidentally noted at Cambell Farm and many more await discovery.

Table 9. Noteworthy plants observed at Campbell Farm.

Species	Noteworthiness
American elm (*Ulmus americana*)	At-risk species from disease
Rue anemone (*Thalictrum thalictroides*)	State Endangered (S1)
American hog-peanut (*Amphicarpaea bracteata*)	High wildlife value
American groundnut (*Apios americana*)	High wildlife value
Pignut hickory (*Carya glabra*)	High wildlife value

Species	Noteworthiness
American hazelnut (*Corylus americana*)	High wildlife value
Black oak (*Quercus velutina*)	High wildlife value
White oak (*Quercus alba*)	High wildlife value
Semi-enriched soil indicator	Semi-enriched soil indicator
Mapleleaf viburnum (*Viburnum acerifoliu*m)	High wildlife value
Southern arrowwood (*Viburnum dentatum*)	High wildlife value
Japanese barberry (*Berberis thunbergia*)	Invasive
European barberry (*Berberis vulgaris*)	Invasive
Winged euonymus (*Euonymus alatus*)	Invasive
Morrow's honeysuckle (*Lonicera morrowii*)	Invasive
Japanese knotweed (*Reynoutria japonica*)	Invasive
Common buckthorn (*Rhamnus cathartica*)	Invasive
Black swallow-wort (*Vincetoxicum nigrum*)	Invasive

Wildlife and Habitats

As mapped by the Wildlife Action Plan, Campbell Farm consists of eight different habitat types. Of these. Appalachian oak-pine forest, grassland, and wet meadow/shrub wetland habitats cover more than 85% of the property (Table 10). The forest hosts numerous breeding songbirds, including Veery and American Woodcock, the latter of which depends on forested uplands and wet meadows in close proximity. Chimney Swifts, another species of greatest conservation need, were observed on multiple occasions feeding on flying insects above the hayfields and wetlands. These areas also provide important foraging habitat for Tree Swallows and other aerial insectivores. Within the forest, we found three vernal pools sustaining a local population of Wood Frogs.

Table 10. Wildlife Action Plan (WAP) habitat types at Campbell Farm.

WAP Habitat Type	Acres	Percentage
Appalachian oak-pine forest	25.2	42%
Developed Impervious	0.3	1%
Developed or Barren land	1.3	2%
Floodplain forest	3.6	6%
Grassland	17.6	29%
Hemlock-hardwood-pine forest	2.1	4%
Open water	0.8	1%
Wet meadow/shrub wetland	9.7	16%

Campbell Farm's wooded area also provides wildlife with an important movement corridor parallel to Beaver Brook. Our camera traps observed numerous mammals using this corridor, including White-tailed Deer (*Odocoileus virginianus*), Coyote (*Canis latrans*), North American Porcupine (*Erethizon dorsatum*), and Striped Skunk (*Mephitis mephitis*). Coyotes, often found to

be more adaptable than Bobcats yet no less important, are the primary predator at this conservation area. Here, they help control populations of mice, squirrels, and rabbits, each of which can imbalance the ecosystem when overpopulated. Within residential areas prey species such as these can also be the bane of many gardeners and landscapers, thus conserving habitat for Coyote, Bobcat, and other predators can benefit the neighborhood.

Table 11. Summary of vertebrate species observed at Campbell Farm. SGCN = Species of Greatest Conservation Need (WAP, 2020).

Observed amphibian species	Wood Frog
Vernal pool obligates	Wood Frog
Amphibian SGCN	None detected
Observed bird species ***See Appendix I for full list***	62
Bird species of conservation concern	Wood Duck[1], Chimney Swift[1,2,3,4,5], American Woodcock[1,2,4], Northern Flicker[1], Eastern Wood-Pewee[1], Barn Swallow[1], Brown Creeper[1], Veery[1,2,4], Common Grackle[3], Ovenbird[1], Palm Warbler[1], Rose-breasted Grosbeak[1]
Observed mammal species	American Beaver, Common Raccoon, Eastern Chipmunk, Eastern Cottontail, Coyote, Eastern Gray Squirrel, White-tailed Deer, North American Porcupine, Red Squirrel, Striped Skunk, Virginia Opossum, White Tailed Deer
Area-sensitive mammal species	Coyote
Mammal SGCN	None detected
Observed reptile species	Common Garter Snake, Common Snapping Turtle, Musk Turtle, Painted Turtle, and one rare species
Reptile SGCN	One species

Bird Conservation Plans

1. Bird Conservation Region 14 (2006)
2. New Hampshire Wildlife Action Plan (2015)
3. Partners in Flight (2016)
4. New Hampshire Audubon (2020)
5. North American Bird Conservation Initiative (2022)

Combined, Campbell Farm's large hayfields and riparian wetlands support a broad array of invertebrate diversity. During surveys focused on birds, reptiles, and other groups, we incidentally observed nearly 100 species of invertebrates. Numerous dragonflies and damselflies hunted smaller insects over the water and fields, while bees, butterflies, moths, and other pollinators took advantage of flowering plants for their nectar and pollen resources. One standout observation, found by a community member and posted to iNaturalist, was a Monarch (*Danaus plexippus*) caterpillar on common milkweed (*Asclepias syriaca*). Monarchs are a species of greatest conservation need in New Hampshire and a species that is red-listed as critically imperiled globally by the International Union for Conservation of Nature (Table 12).

Table 12. Noteworthy insects incidentally observed at Campbell Farm.

Species Name	**Significance**
Monarch (*Danaus plexippus*)	Species of Greatest Conservation Need
Slender Spreadwing (*Lestes rectangularis*)	First public record for Windham
Spangled Skimmer (*Libellula cyanea*)	First public record for Windham
Dot-tailed Whiteface (*Leucorrhinia intacta*)	First public record for Windham
Coenus delius	First public record in New Hampshire
Cyrtolobus sp.	Second public record in Rockingham County
Two-lined Burrowing Bug (*Pangaeus bilineatus*)	Second public record in Rockingham County
Limonius aurifer	Second public record in New Hampshire
Allegheny Mining Bee (*Andrena alleghaniensis*)	Second public record in Rockingham County
Northern Red Oak Jewel Beetle (*Brachys aerosus*)	First public record in Rockingham County
Cornsilk Fly sp. (*Euxesta*)	First public record in New Hampshire
Black-patched Clepsis Moth (*Clepsis melaleucanus*)	First public record in Rockingham County
Chalepus walshii	First public record in New Hampshire
Errastunus ocellaris	Second public record in New Hampshire
Oak Wart Gall Wasp (*Callirhytis quercusfutilis*)	First public record in Rockingham County
Phylloxera caryaesemen	Second public record in New Hampshire
Stropenron hieroglyphica	First public record in Rockingham County

Selected photos (left to right): White-tailed Deer, Coyote, and Wood Frog (bloated, most likely due to road salt polluting a wetland).

Left to right: *Coenus delius*, Northern Red Oak Jewel Beetle, and *Stropenron hieroglyphica*.

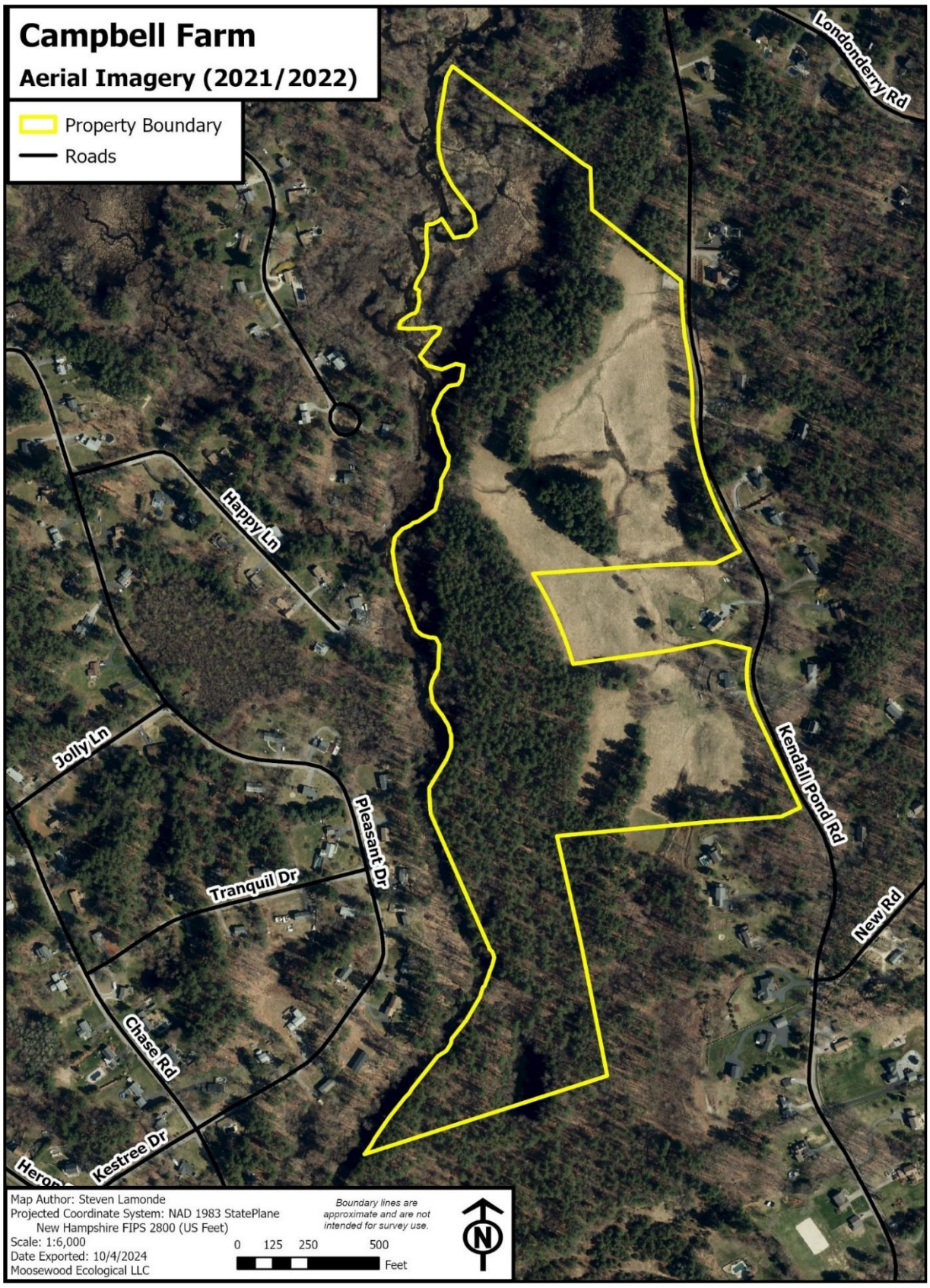

Figure 5. Aerial imagery of Campbell Farm displaying the properties large hayfields.

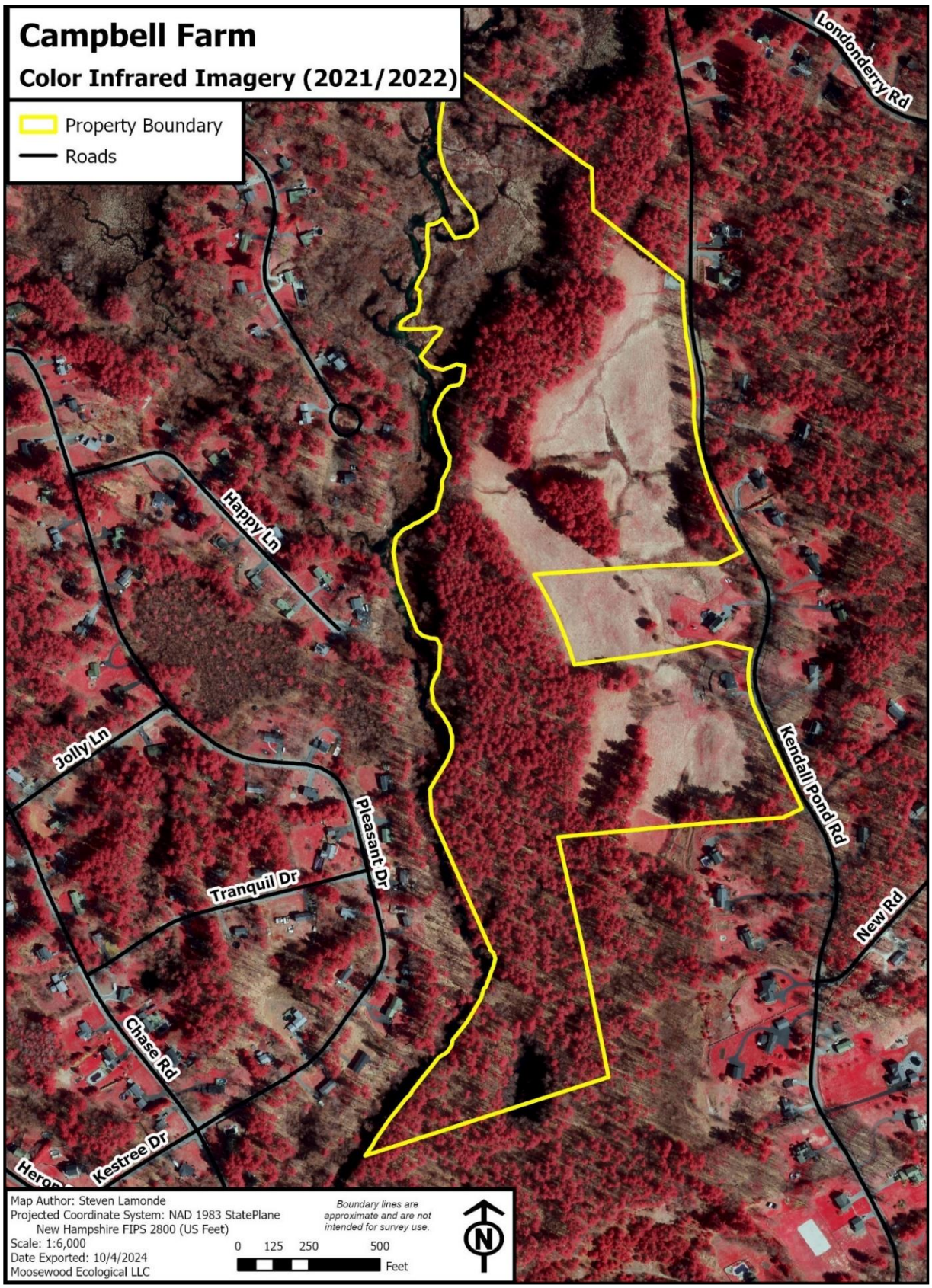

Figure 6. Color infrared imagery depicting a white pine-dominated forest at Campbell Farm.

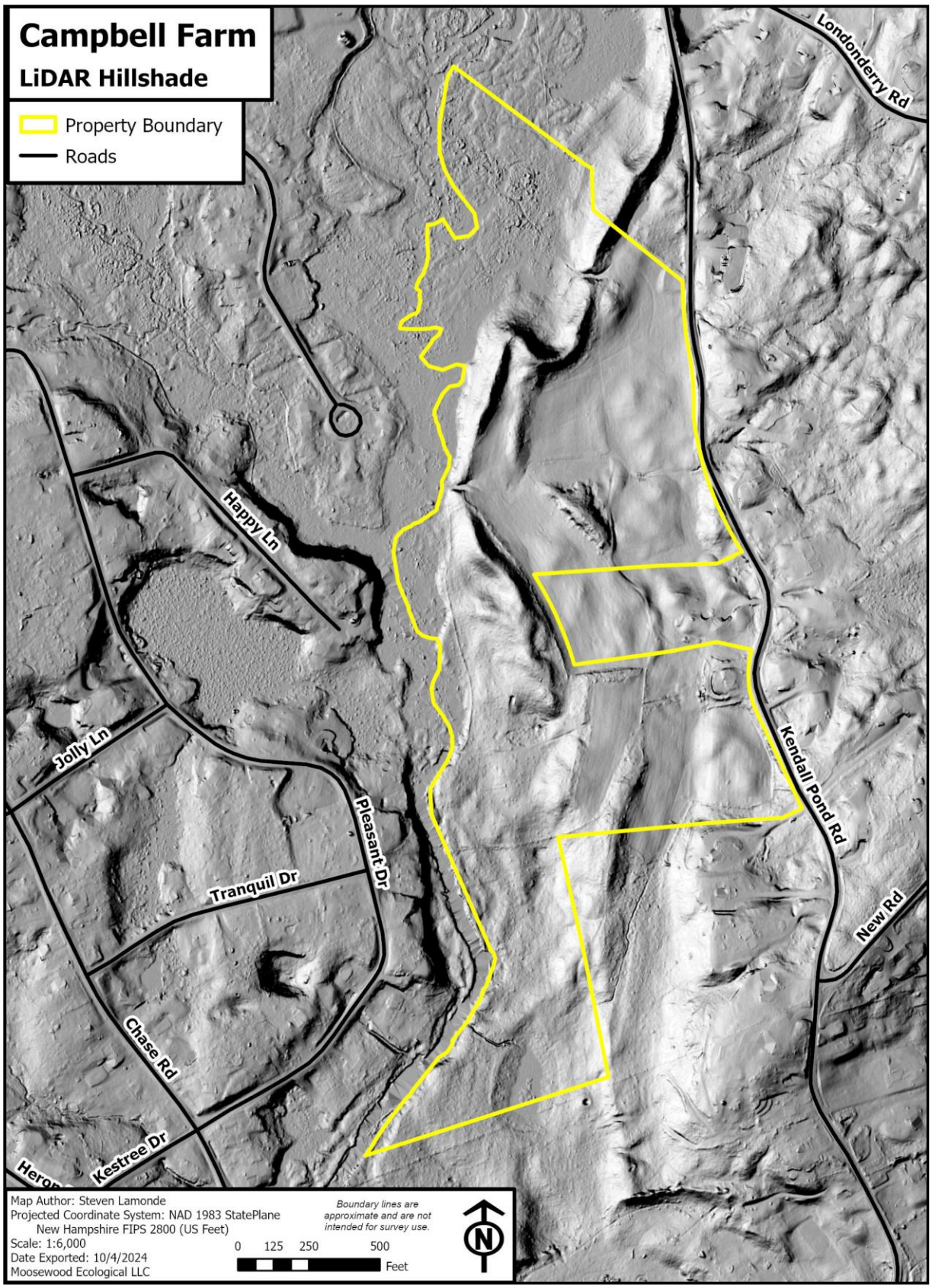

Figure 7. LiDAR hillshade model that clearly shows a glacial esker at Campbell Farm.

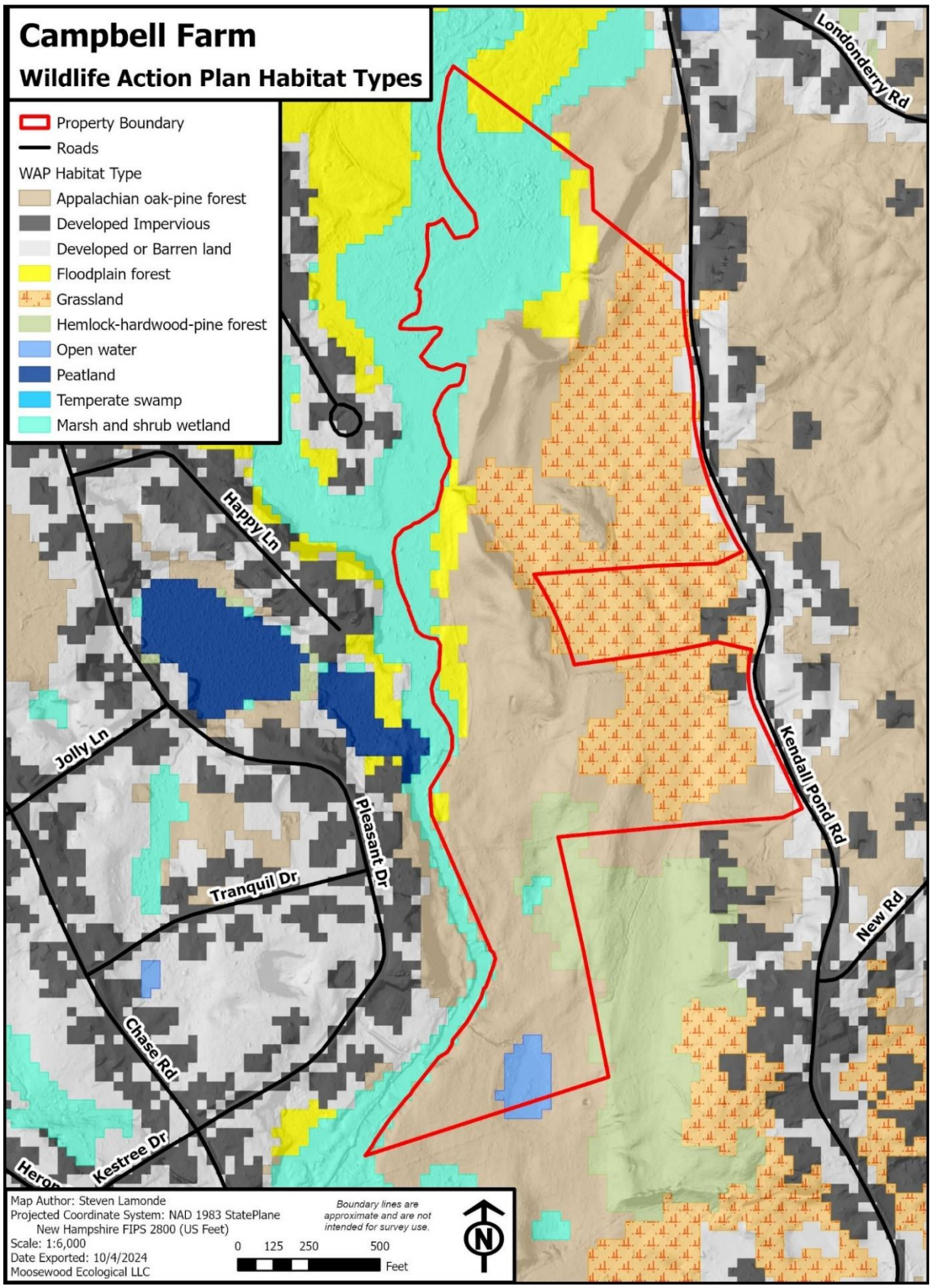

Figure 8. Floodplain forests and large grasslands set Campbell Farm apart from other properties.

Clyde Pond & Gage Lands

Parcels: 20-D-1200, 20-D-1550, 20-D-1600, 20-D-1800, 20-D-2000, 20-E-300 and 20-E-350
GIS-calculated area: 228.2 acres


Rocky outcrop near Clyde Pond.

Referred to by the public and various maps by multiple names, this conservation area surrounds the Windham High School and covers most of the undeveloped area bounded by London Bridge Road to the north and west, Burnham Road to the south, and Bear Hill Road to the east. At the northern end of this multi-parcel complex lies Clyde Pond, a favorite local swimming hole with a trailhead that provides easy access to a large network of mountain biking trails. Between Clyde Pond and the high school lies a steep slope that supports several uncommon plant species. A mixture of wide footpaths and singletrack hiking and biking trails can be accessed from near the high school's athletic fields, and these trails also connect to the Clyde Pond trail system. Multiple wetlands, vernal pools, rocky outcrops, and other natural features occur throughout this area and provide important habitat for flora and fauna.

Geologic Setting, Topography, and Soils

Within the large Clyde Pond and Gage Lands conservation area, semi-frequent outcrops of Berwick Formation bedrock and post-glacial wetlands add scenic values to this popular location (Table 13). The topographic complexity, ranging from steep slopes to relatively flat land, add to the property's attractiveness for mountain biking. Several rocky outcrops host uncommon plants that depend on the availability of certain nutrients coming from the bedrock. Where these outcrops are hidden, glacial till supports a variety of soil types. Well-drained soils in the Chatfield-Hollis-Canton complex cover over half of the conservation area, whereas the larger wetlands contain poorly drained Walpole fine sandy loam or very poorly drained Freetown and Natchaug mucky peats (Table 14). The Gage Lands rise to a maximum elevation about Nanchang 430 feet along the southern property boundary, dropping to a minimum elevation of about 200 feet at the outlet of Clyde Pond.

Table 13. Geologic characteristics of the Clyde Pond and Gage Lands conservation area.

Bedrock geology	Berwick Formation (Silurian) - metasedimentary and metavolcanic rocks of the Merrimack Trough.
Surficial geology	Till (Pleistocene) - light- to dark-gray, non-sorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; contains some gravel. Swamp deposits (Holocene) - muck, peat, silt, and sand. Generally 5 to 10 feet thick, but may be as much as 20 feet thick. Outcrops - exposed bedrock.

Table 14. Soil types and drainage classes for the Clyde Pond and Gage Lands conservation area.

Soil Type	Acres	Drainage Class
Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, rocky	7.0	Well drained
Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	138.6	Well drained
Deerfield loamy fine sand, 0 to 3 percent slopes	3.6	Moderately well drained
Freetown and Natchaug mucky peats, ponded, 0 to 2 percent slopes	4.5	Very poorly drained
Hollis-Rock outcrop-Chatfield complex, 15 to 60 percent slopes	71.6	Well drained
Walpole very fine sandy loam, 3 to 8 percent slopes, very stony	2.9	Poorly drained

Natural Communities

Clyde Pond and Gage Lands contain a mix of Appalachian oak-pine forest and hemlock-hardwood-pine forest ecosystems. Upland natural communities closely resemble dry Appalachian oak forest, hemlock-beech-oak-pine forest, and semi-rich mesic sugar maple forest. This latter natural community is located in the northern portion of the property in association with rocky outcrops and talus-like forest just south of Clyde Pond. It is associated with several rich-sited plants such as sugar maple, white ash, northern maidenhair fern, hophornbeam, and round-lobed hepatica.

Wetland communities include small pockets of temperate forested swamps, of which many are functioning as vernal pools. Seasonally flooded red maple swamp communities dominated the wetlands at Clyde Pond and Gage Lands. Many of these swamps also contain various amounts of black gum, also called black tupelo. While not rare, these swamps are locally significant due to the presence of black gum, which can reach ages of 300 years or more in New Hampshire. Small examples of emergent marsh wetland communities are present as well.

Black gum (black tupelo) tree.

While no rare or exemplary natural communities were observed, these properties provide habitat for known rare plants. Additional rare plants may also occur, especially in the patches of enriched forest. The Clyde Pond area hosts a small population of the State-Endangered, rue anemone as well as several species noteworthy for their aesthetic value or wildlife benefits. Field surveys incidentally detected over 160 plant species at the Clyde Pond and Gage Lands conservation area.

Table 15. Noteworthy plants observed at the Clyde Pond and Gage Lands conservation area.

Species	**Noteworthiness**
American elm (*Ulmus americana*)	At-risk species from disease
Rue anemone (*Thalictrum thalictroides*)	State Endangered (S1)
White ash (*Fraxinus americana*)	Species in rapid decline
American hog-peanut (*Amphicarpaea bracteata*)	Wildlife value
American hophornbeam (*Ostrya virginiana*)	Semi-enriched soils indicator
American hornbeam (*Carpinus caroliniana*)	Semi-enriched soils indicator
Black tupelo (*Nyssa sylvatica*)	Wildlife value
Northern maidenhair fern (*Adiantum pedatum*)	Enriched soil indicator
Round-lobed hepatica (*Hepatica americana*)	Rich site indicator
Glossy buckthorn (*Frangula alnus*)	Invasive
Brown knapweed (*Centaurea jacea*)	Invasive
Japanese barberry (*Berberis thunbergia*)	Invasive
Multiflora rose (*Rosa multiflora*)	Invasive
Oriental bittersweet (*Celastrus orbiculatus*)	Invasive
Winged euonymus (*Euonymus alatus*)	Invasive

Wildlife and Habitats

The varied natural communities at the Clyde Pond and Gage Lands conservation area support an equally diverse range of wildlife habitats. Eight habitat types occur within this area according to the Wildlife Action Plan with the two most dominant types being hemlock-hardwood-pine forest and Appalachian oak-pine forest (Tabel 16). The remaining area contains a mixture of forested temperate swamps and shrub wetlands. Clyde Pond represents the only significant open water body within the conservation area, and open grassy patches occur in the larger canopy openings nearby. Combined these habitats support populations of more than 450 observed species, and many more will be discovered in the future.

Fairy Shrimp, Spotted Salamander, and Wood Frog, three obligate vernal pool species, helped confirm the presence of three vernal pools within the Clyde Pond and Gage Lands conservation area. Due to either dense vegetation, deep water, or a combination of both at many of the small wetlands, more vernal pools were not confirmed during our survey effort. However, 24 additional water-filled depressions were categorized as potential or probable vernal pools based on the presence of wetland plants, water depth, and/or other characteristics.

Other noteworthy vertebrates detected at the property include American Woodcock, Veery, and Scarlet Tanager, three bird species of greatest conservation need in New Hampshire. Scarlet Tanagers rely on large, unfragmented forests for breeding, and their presence typically indicates a healthy forest ecosystem. Fifty-six other bird species were also observed at Clyde Pond and the Gage Lands. While Coyote was the only area-sensitive mammal observed at this conservation

area over the course of the study, the site's habitat availability suggest that Bobcat likely also occur.

Table 16. Wildlife Action Plan (WAP) habitat types at Clyde Pond and Gage Lands.

WAP Habitat Type	Acres	Percentage
Appalachian oak-pine forest	30.3	13%
Developed Impervious	0.6	<1%
Developed or Barren land	0.8	<1%
Grassland	0.4	<1%
Hemlock-hardwood-pine forest	175.1	77%
Open water	3.7	2%
Temperate swamp	9.6	4%
Wet meadow/shrub wetland	7.8	3%

Table 17. Summary table of vertebrate observations at Clyde Pond and Gage Lands. SGCN = Species of Greatest Conservation Need (WAP, 2020).

Observed amphibian species	Eastern Red-backed Salamander, Gray Treefrog, Green Frog, Northern Two-lined Salamander, Pickerel Frog, Spotted Salamander, Spring Peeper, Wood Frog
Vernal pool obligates	Fairy Shrimp, Spotted Salamander, Wood Frog
Amphibian SGCN	None detected
Observed bird species ***See Appendix I for full list***	59
Bird species of conservation concern	Wood Duck[1], American Woodcock[1,2,4], Northern Flicker[1], Eastern Wood-Pewee[1], Barn Swallow[1], Brown Creeper[1], Veery[1,2,4], Common Grackle[3], Ovenbird[1], Northern Parula[1], Scarlet Tanager[2,4]
Observed mammal species	American Beaver, Coyote, North American Deer Mice, White-tailed Deer
Area-sensitive mammal species	Coyote
Mammal SGCN	None detected
Observed reptile species	Common Garter Snake, Northern Watersnake, Painted Turtle
Reptile SGCN	None detected

Bird Conservation Plans

1. Bird Conservation Region 14 (2006)
2. New Hampshire Wildlife Action Plan (2015)
3. Partners in Flight (2016)
4. New Hampshire Audubon (2020)
5. North American Bird Conservation Initiative (2022)

Amongst the 165 invertebrate species observed at Clyde Pond and Gage Lands, we discovered a robust population of Broad-winged Skippers (*Poanes viator*) at Clyde Pond. This native butterfly species has adapted to use the invasive common reed (*Phragmites australis*) as a host plant, and this reed is abundant at Clyde Pond. Broad-winged Skippers are typically found closer to the seacoast in New Hampshire, making this inland observation noteworthy. Perhaps a more significant discovery was the documentation of a Gulf Coast Tick (*Amblyomma maculatum*), also near Clyde Pond. This marked the second publicly-known record of this southern species north of Connecticut, suggesting a possible range extension (Table 18). Fortunately, these ticks only rarely carry American tick bite fever (*Rickettsia parkeri*), a bacterial infection than can affect humans.

Broad-winged Skipper.

Table 18. Noteworthy invertebrates incidentally observed at Clyde Pond and Gage Lands.

Species Name	**Significance**
Chalk-fronted Corporal (*Ladona julia*)	First public record for Windham
Isoperla sp.	First public record for Rockingham County
Spirea Aphid (*Aphis spiraecola*)	First public record for New Hampshire
Gliaspilota glutinosa	First public record for New Hampshire
Agromyza idaeiana	First public record for New Hampshire
Black Purseweb Spider (*Sphodros niger*)	Third public record for northern New England
Red-necked Cane Borer Beetle (*Agrilus ruficollis*)	First public record for Rockingham County
Tropisternus sp.	Fourth public record for New Hampshire
Phlegra hentzi	First public record for Rockingham County
Gulf Coast Tick (*Amblyomma maculatum*)	Second public record in New England; First public record in northern New England
Microrhopala excavata	First public record in Rockingham County
Thin-tailed Long-horned Beetle (*Typocerus acuticauda*)	Fourth public record in New Hampshire; First public record in Rockingham County
Dolerosomus silaceus	First public record in Rockingham County
Striated Jewel Beetle (*Buprestis striata*)	Second public record in Rockingham County
Liriomyza fricki	First public record in Rockingham County

Selected photos (left to right): Spring Peeper, *Isoperla* sp., and Red-winged Blackbird.

Left to right: Northern maidenhair fern, *Agromyza idaeiana*, and Black Purseweb Spider.

Left to right: Red-necked Cane Borer Beetle, Round-lobed hepatica, and *Phlegra hentzi*.

Left to right: Gulf Coast Tick, *Microrhopala excavata*, and Thin-tailed Long-horned Beetle.

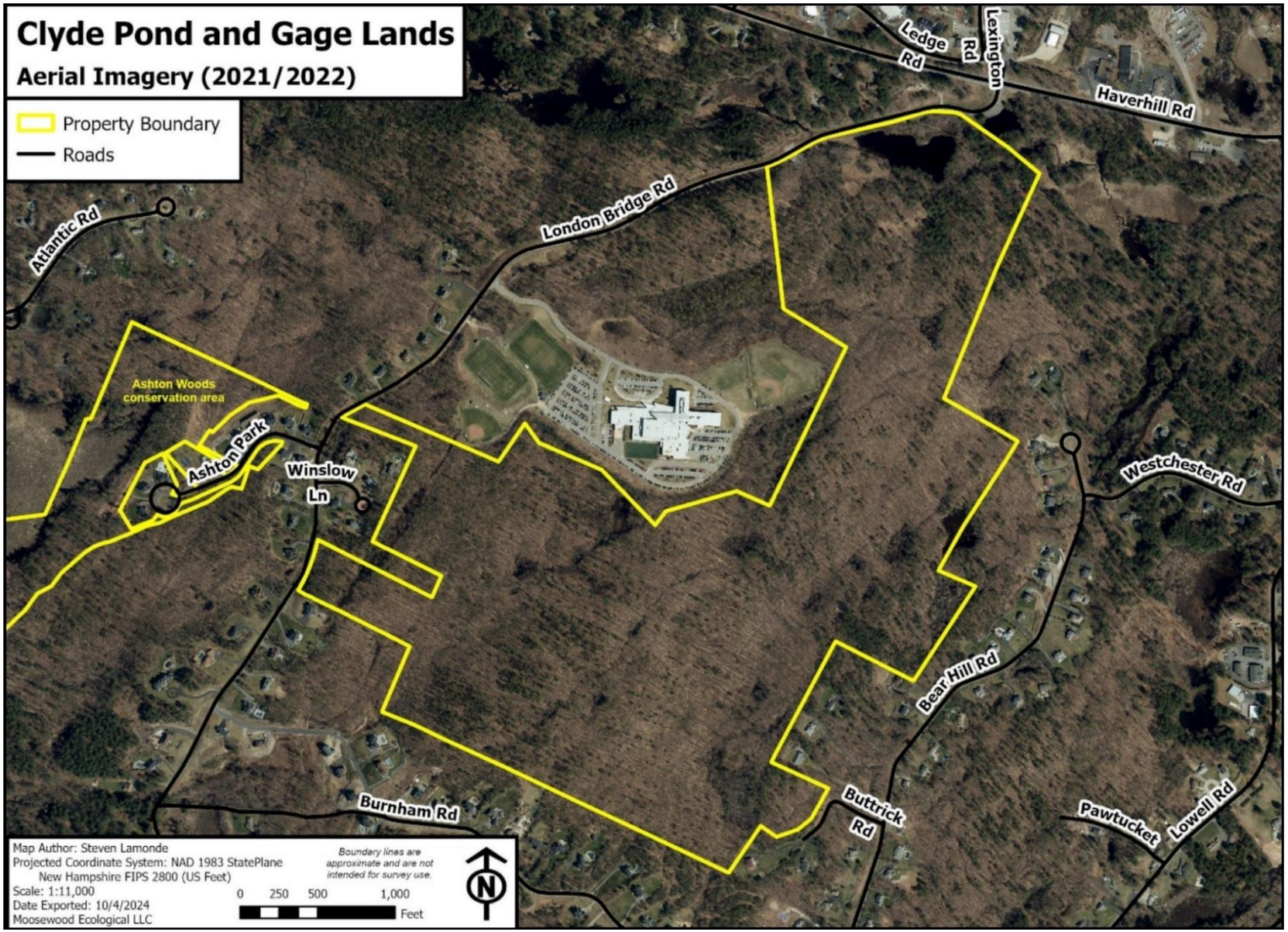

Figure 9. Aerial imagery of Clyde Pond and Gage Lands depicting hardwood-dominated forests and scattered wetlands.

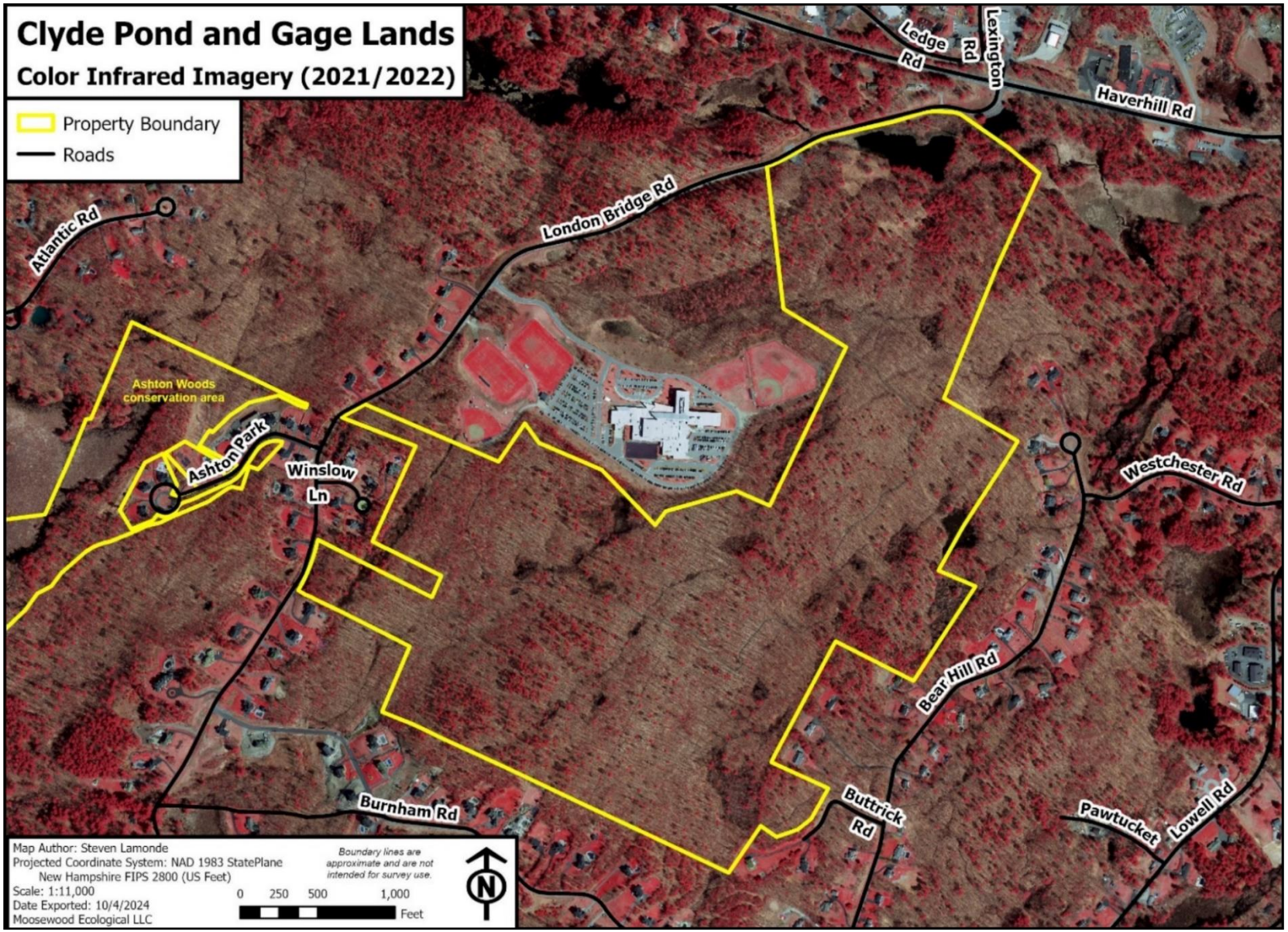

Figure 10. Color infrared imagery of Clyde Pond and Gage Lands contrasting natural forest cover with the school's mown fields.

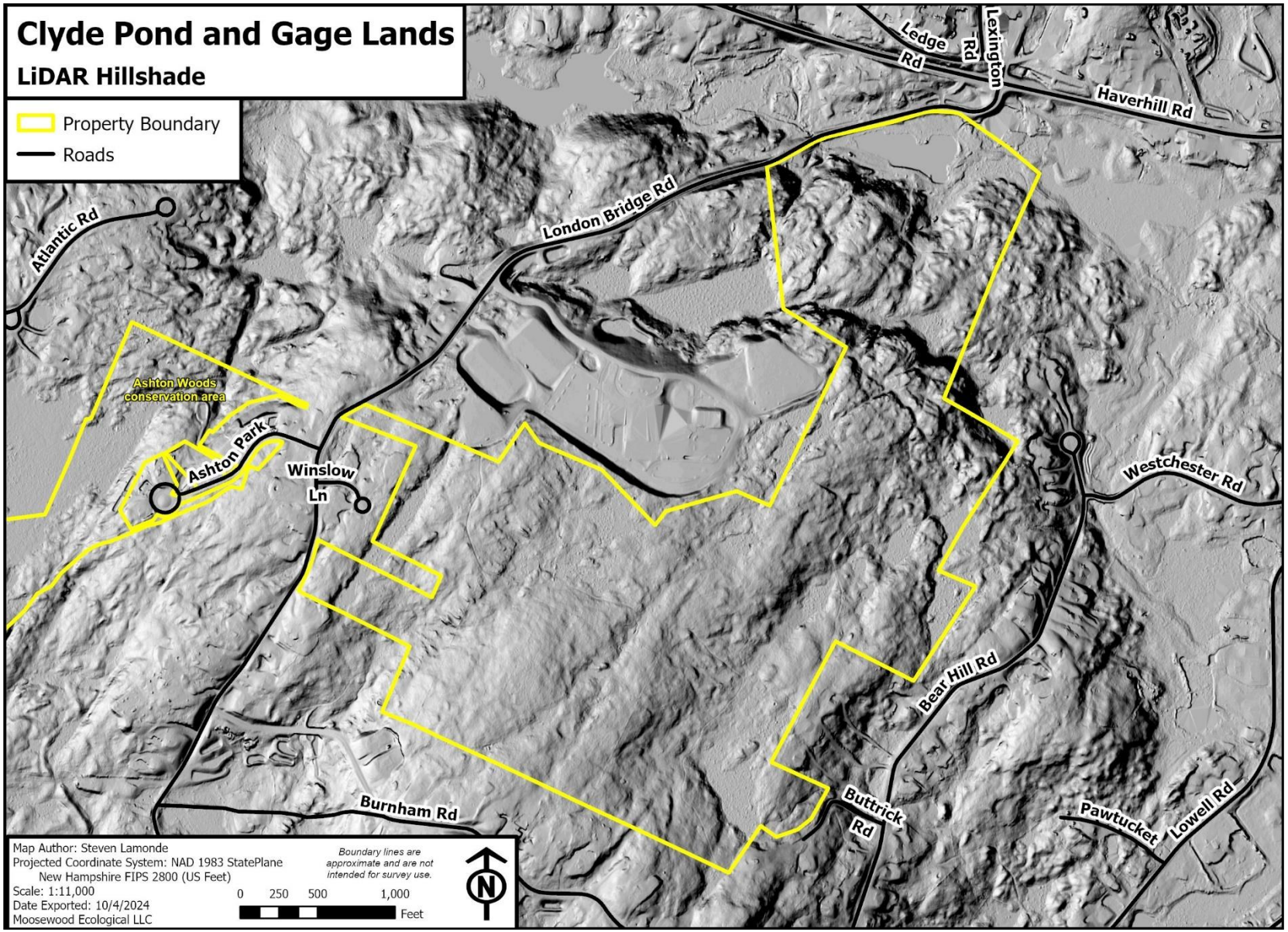

Figure 11. LiDAR hillshade model for Clyde Pond and Gage Lands displaying two steep, north-facing slopes among other features.

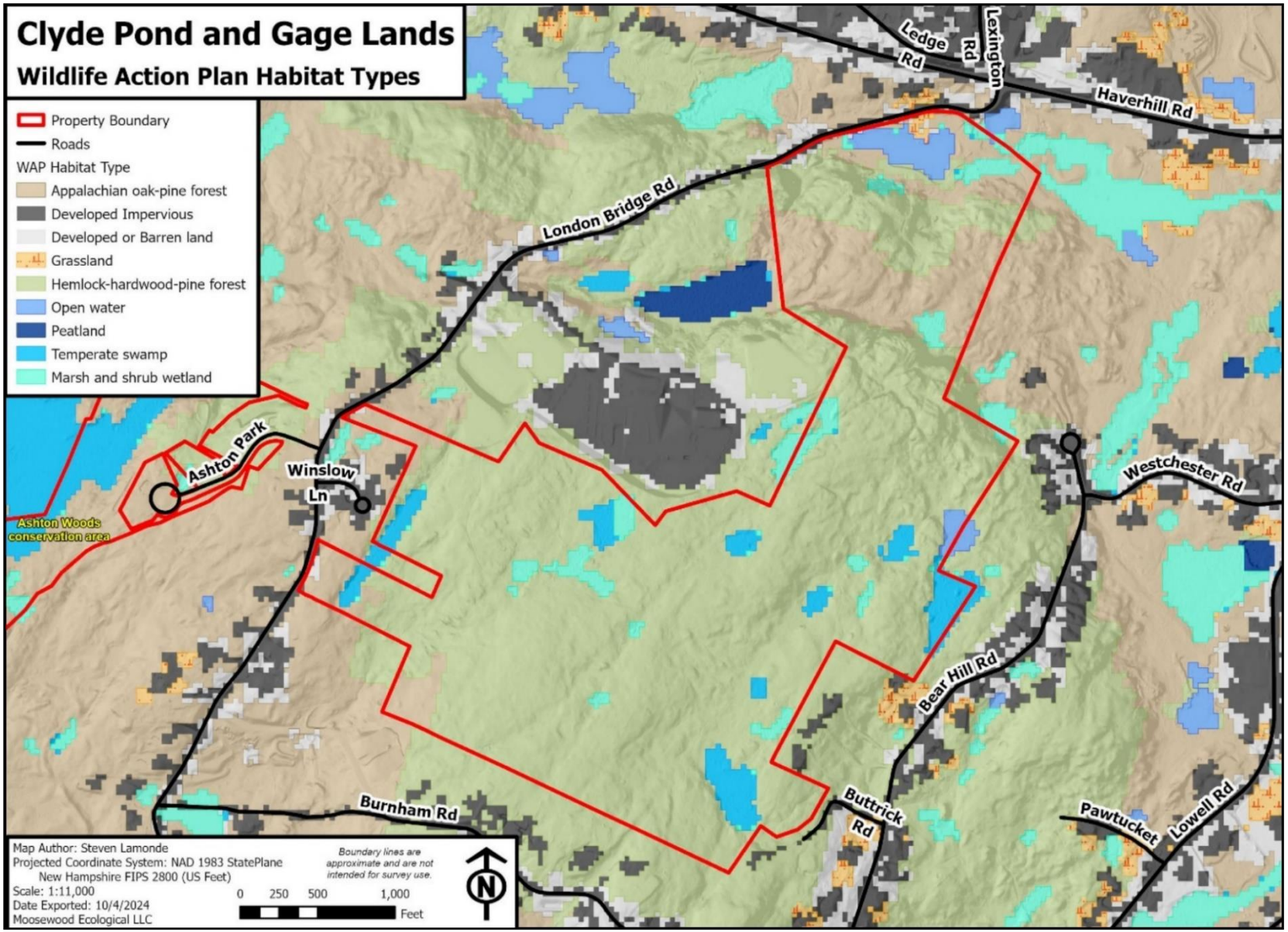

Figure 12. Hemlock-hardwood-pine forests surround a mixture of forested and shrub wetlands at the Gage Lands.

Deer Leap

Parcel: 25-E-10
GIS-calculated area: 54.8

Exposed bedrock ledges at Deer Leap.

The 54-acre Deer Leap Natural Area, situated in the southeastern corner of Windham near Marblehead Road, offers visitors a variety of experiences, from sweeping views of Moeckel Pond and dramatic rock cliffs to a well-maintained network of trails that weave through mixed hardwood and pine forests. Parking for multiple vehicles is available at the northeastern corner of the property off Woodbury Road as well as the cartop boat launch located at the end of Bayleaf Way, which runs part way along the southern end of the property. Additionally, while Rock Pond itself is not located within the Deer Leap Natural Area, this property also conserves a public canoe launch to Rock Pond.

Geologic Setting, Topography, and Soils

Unlike the four other focal properties, Deer Leap stands out as the only property whose bedrock consists of Ayer Granodiorite, a type of intrusive igneous rock (Table 19). The conservation area's steep ledges at the southern end of the property prominently feature this bedrock type. Many of these ledges can be safely accessed from the trail system. Another noteworthy geologic feature at Deer Leap is a large glacial erratic boulder located on the trailside to the northeast of the central wetland. This conservation area's till-based soils are fairly shallow and well-drained given the land's steep pitch, yet about two acres of poorly drained Pipestone soils and very poorly drained Swansea mucky peat occur as well (Table 20).

Table 19. Geologic characteristics of Deer Leap Natural Area.

Bedrock geology	Ayer Granodiorite (Early Silurian) - plutonic and associated volcanic rocks
Surficial geology	Till (Pleistocene) - light- to dark-gray, non-sorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; contains some gravel. Outcrops - exposed bedrock.

Table 20. Soil types and drainage classes of Deer Leap Natural Area.

Soil Type	Acres	Drainage Class
Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, rocky	3.2	Well drained
Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	26.2	Well drained

Soil Type	Acres	Drainage Class
Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	0.1	Well drained
Hollis-Rock outcrop-Chatfield complex, 15 to 60 percent slopes	20.7	Well drained
Pipestone loamy sand, 0 to 3 percent slopes	0.0	Poorly drained
Pipestone sand, 0 to 5 percent slopes	0.4	Poorly drained
Swansea mucky peat, 0 to 2 percent slopes	1.8	Very poorly drained
Water	0.4	
Woodbridge fine sandy loam, 3 to 8 percent slopes	2.0	Moderately well drained

Natural Communities

The Deer Leap property is particularly noteworthy for the presence of the dry Appalachian oak forest community across the upland area of the preserve. This forest is dominated by red oak along with lesser amounts of white oak, black oak, and scarlet oak. Other hardwood trees of this dry forest include hophornbeam, shagbark hickory, sassafras, red maple, and multiple-trunked American chestnut saplings affected with the chestnut blight. White pine and pitch pine occasionally occur with this natural community. A small example of a semi-rich mesic sugar maple forest can be found adjacent to the trail as one enters the property from the parking lot. Sugar maple and white ash dominate this forest community.

This habitat covers only 12% of New Hampshire's forested landscape and is recognizable by the dry shrubby understory with a strong presence of southern oaks, including scarlet oak. This habitat is strongly tied to areas of acidic soils on sunny slopes, moraines, rocky areas, often below 900 feet and it is unsurprising to also see species like pink lady's slipper (*Cypripedium acaule*), black huckleberry (*Gaylussacia baccata*), along with pipsissewa (*Chemaphila umbellata*) and other members of the wintergreen genus. Alongside this community, in the lowlands near Rock Pond, we also found species like black tupelo and swamp milkweed that favor a wetter environment. Invasives are present, although they are less of a dominant presence than at some of our other study sites. A total of 63 plant species were incidentally noted at Deer Leap. In addition to the upland forests, a small example of drainage marsh - shrub system is present in the southeastern portion of Deer Leap.

Table 21. Noteworthy plants observed at Deer Leap Natural area.

Species	Noteworthiness
American chestnut (*Castanea dentata*)	At-risk species from disease
Scarlet oak (*Quercus coccinea*)	Uncommon
American hophornbeam (*Ostrya virginiana*)	Semi-enriched soils indicator

Species	Noteworthiness
Black tupelo (*Nyssa sylvatica*)	Habitat indicator
Cardinal flower (*Lobelia cardinalis*)	Semi-enriched soils indicator
Eastern redcedar (*Juniperus virginiana*)	Habitat indicator
Mapleleaf viburnum (*Viburnum acerifolium*)	Wildlife value
Northern bush honeysuckle (*Diervilla lonicera*)	Wildlife value
Pitch pine (*Pinus rigida*)	Habitat indicator
Sassafras (*Sassafras albidum*)	Wildlife value
Swamp milkweed (Asclepias incarnata)	Wildlife value
White oak (*Quercus alba*)	Wildlife value
Glossy buckthorn (*Frangula alnus*)	Invasive
Common buckthorn (*Rhamnus cathartica*)	Invasive
Multiflora rose (*Rosa multiflora*)	Invasive

Wildlife and Habitats

The many oaks and occasional pines within Deer Leap Natural Area's dominant Appalachian oak-pine forest and hemlock-hardwood-pine forest provide wildlife with abundant hard mast in the forms of acorns and pine seeds (Table 22). Accordingly, our surveys detected a healthy population of Eastern Gray Squirrels, Eastern Chipmunks, and two of their predators, Gray Fox and Red Fox. The property's topography and soils are not well-suited for vernal pools, yet the large, shrub wetland near the southern end of the property functions as a vernal pool despite not drying completely in most years. This wetland should be checked in future years to establish if Wood Frogs or Spotted Salamanders are breeding at Deer Leap. While this pool is too vegetated for virtually all waterfowl except Wood Ducks, nearby Moeckel Pond serves as an important migratory stopover site for many birds including Canada Geese, Mallards, Ring-necked Ducks, Buffleheads, Hooded Mergansers, and Common Mergansers. Chimney Swifts, a species of greatest conservation need in New Hampshire, were observed foraging on flying insects over Moeckel Pond and the forest canopy at Deer Leap. Below the canopy, Scarlet Tanagers, Rose-breasted Grosbeaks, Eastern Wood-Pewees, and three other species of conservation concern utilize the habitat during breeding and migratory seasons (Table 23).

Our surveys detected few reptiles and amphibians at Deer Leap, likely due to the property's limited distribution of wetlands. However, numerous reptiles and amphibians have been reported by the community from Moeckel Pond, whose shallow water and plentiful basking sites provide favorable habitat for aquatic and semi-aquatic species. Relative to the other focal properties, we incidentally noted fewer noteworthy invertebrates but two species stood out. The first was a

phantom midge larva in the genus *Mochlonyx* that was photographed in the vernal pool on April 3, 2023. This discovery represented just the second public observation of this genus in New Hampshire. The other discovery was a Stream Bluet (*Enallagma exsulans*) photographed on July 4, 2023 by a community member and represented the first public observation of this semi-uncommon damselfly in Windham. To-date, 38 other invertebrate species have been incidentally documented at Deer Leap and submitted to the Windham Biodiversity Project on iNaturalist.

Mochlonyx midge larva.

Table 22. Wildlife Action Plan (WAP) habitat types at Deer Leap Natural Area.

WAP Habitat Type	**Acres**	**Percentage**
Appalachian oak-pine forest	39.4	72%
Developed Impervious	<0.1	<1%
Developed or Barren land	2.1	4%
Hemlock-hardwood-pine forest	10.1	18%
Temperate swamp	1.8	3%
Wet meadow/shrub wetland	1.5	3%

Table 23. Summary of vertebrate observations at Deer Leap Natural Area. SGCN = Species of Greatest Conservation Need (WAP, 2020).

Observed amphibian species	American Toad, Gray Treefrog
Vernal pool obligates	Fairy shrimp
Amphibian SGCN	None detected
Observed bird species ***See Appendix I for full list***	52
Bird species of conservation concern	Wood Duck[1], Chimney Swift[1,2,3,4,5], Eastern Wood-Pewee[1], Barn Swallow[1], Brown Creeper[1], Ovenbird[1], Scarlet Tanager[2,4], Rose-breasted Grosbeak[1]
Observed mammal species	Common Raccoon, Eastern Chipmunk, Eastern Gray Squirrel, Gray Fox, Red Fox, Striped Skunk, Virginia Opossum, White-tailed Deer
Area-sensitive mammal species	None detected
Species of greatest conservation need	None detected
Observed reptile species	Common Garter Snake, Painted Turtle
Reptile SGCN	None detected

Bird Conservation Plans

1. Bird Conservation Region 14 (2006)
2. New Hampshire Wildlife Action Plan (2015)
3. Partners in Flight (2016)
4. New Hampshire Audubon (2020)
5. North American Bird Conservation Initiative (2022)

Selected photos (left to right): Red Fox, Common Merganser, and glossy buckthorn.

Left to right: Sassafras, pitch pine, and American chestnut.

Left to right: American hop-hornbeam, Hooded Mergansers, and Ring-necked Ducks.

Left to right: Springtime Fairy Shrimp, Neighborly Mining Bee, and red columbine.

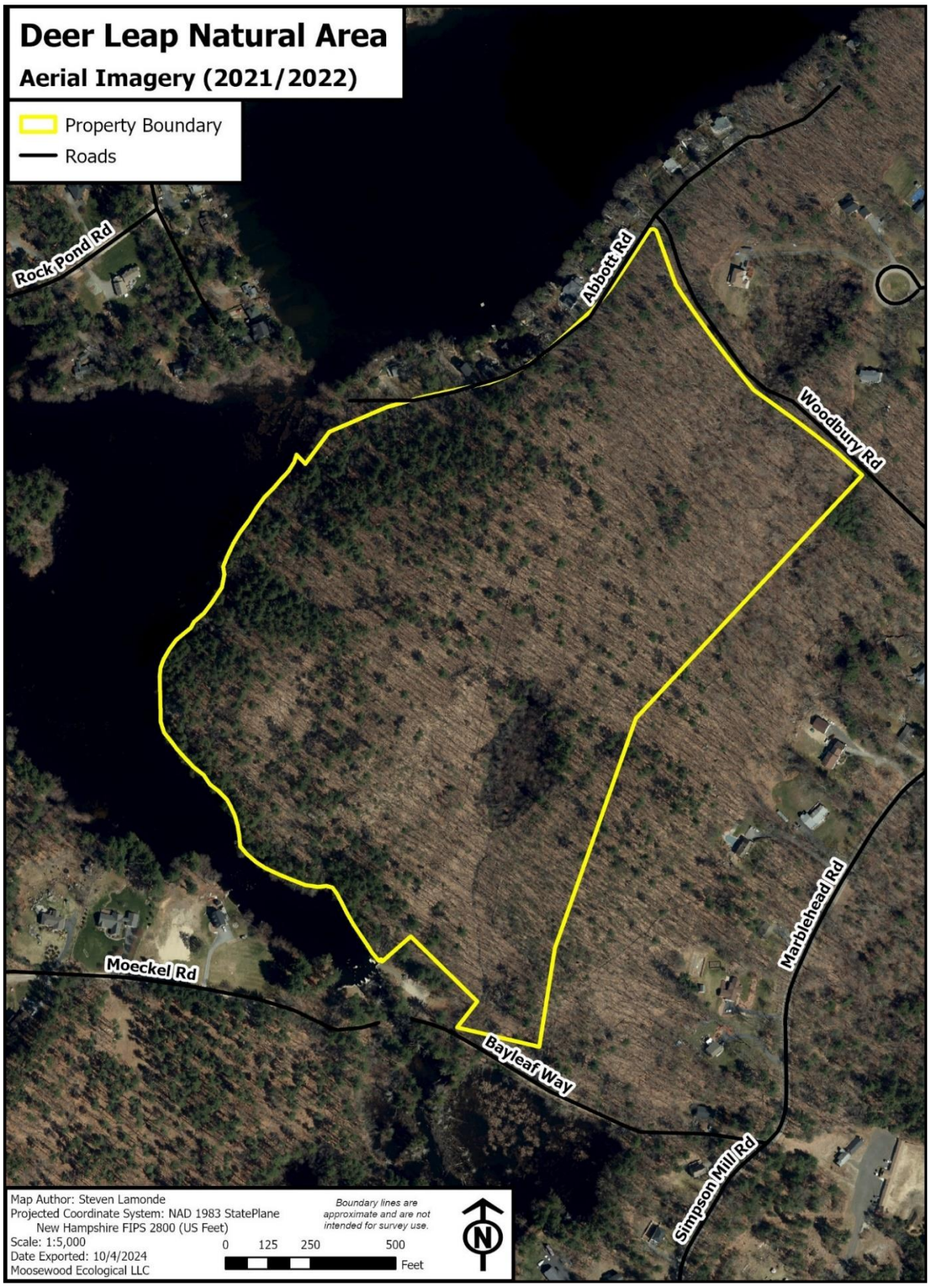

Figure 13. Aerial imagery of Deer Leap showing pines correlated with the steeper slopes.

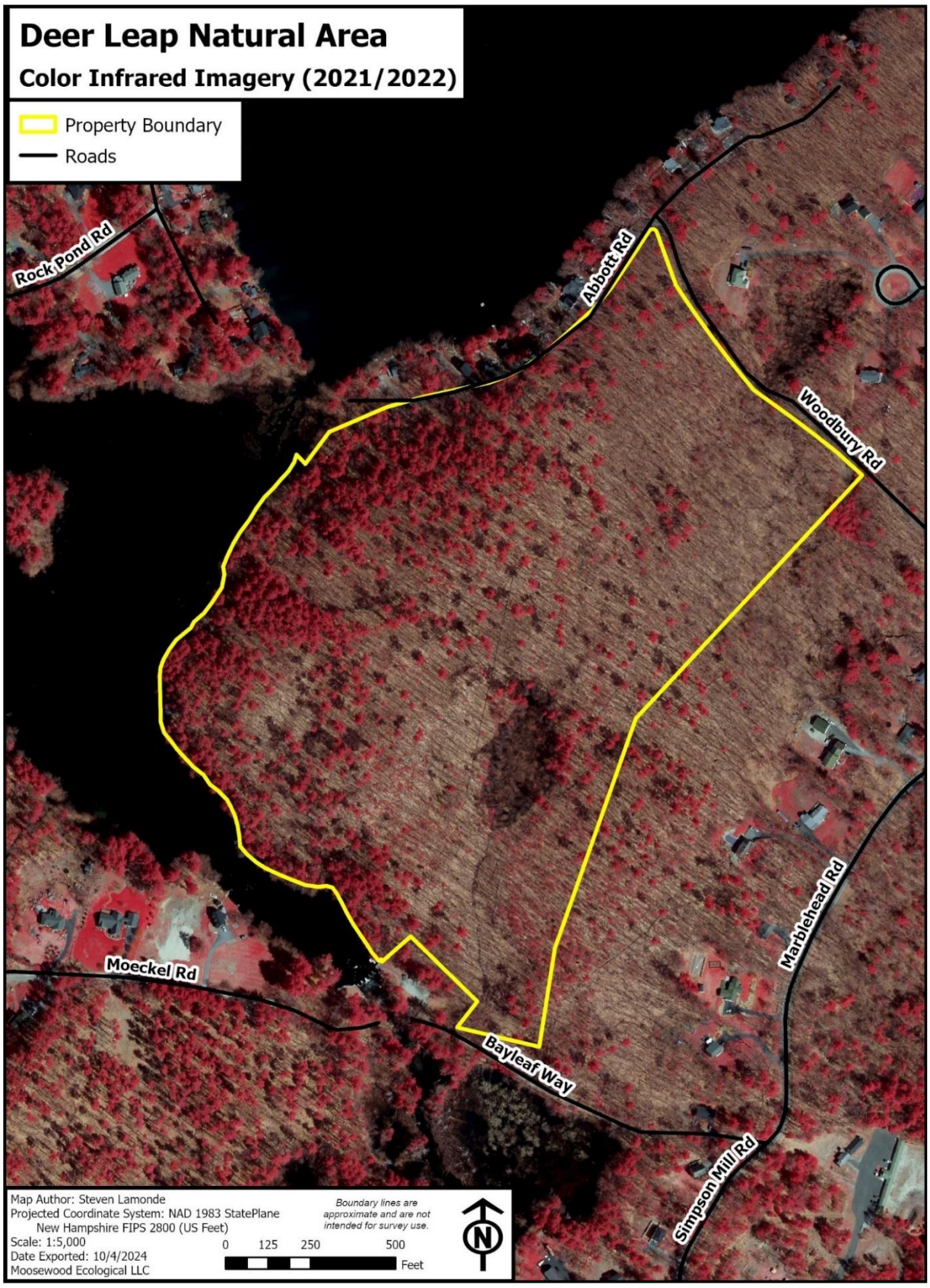

Figure 14. Color infrared imagery clearly displaying Deer Leap's large vernal pool.

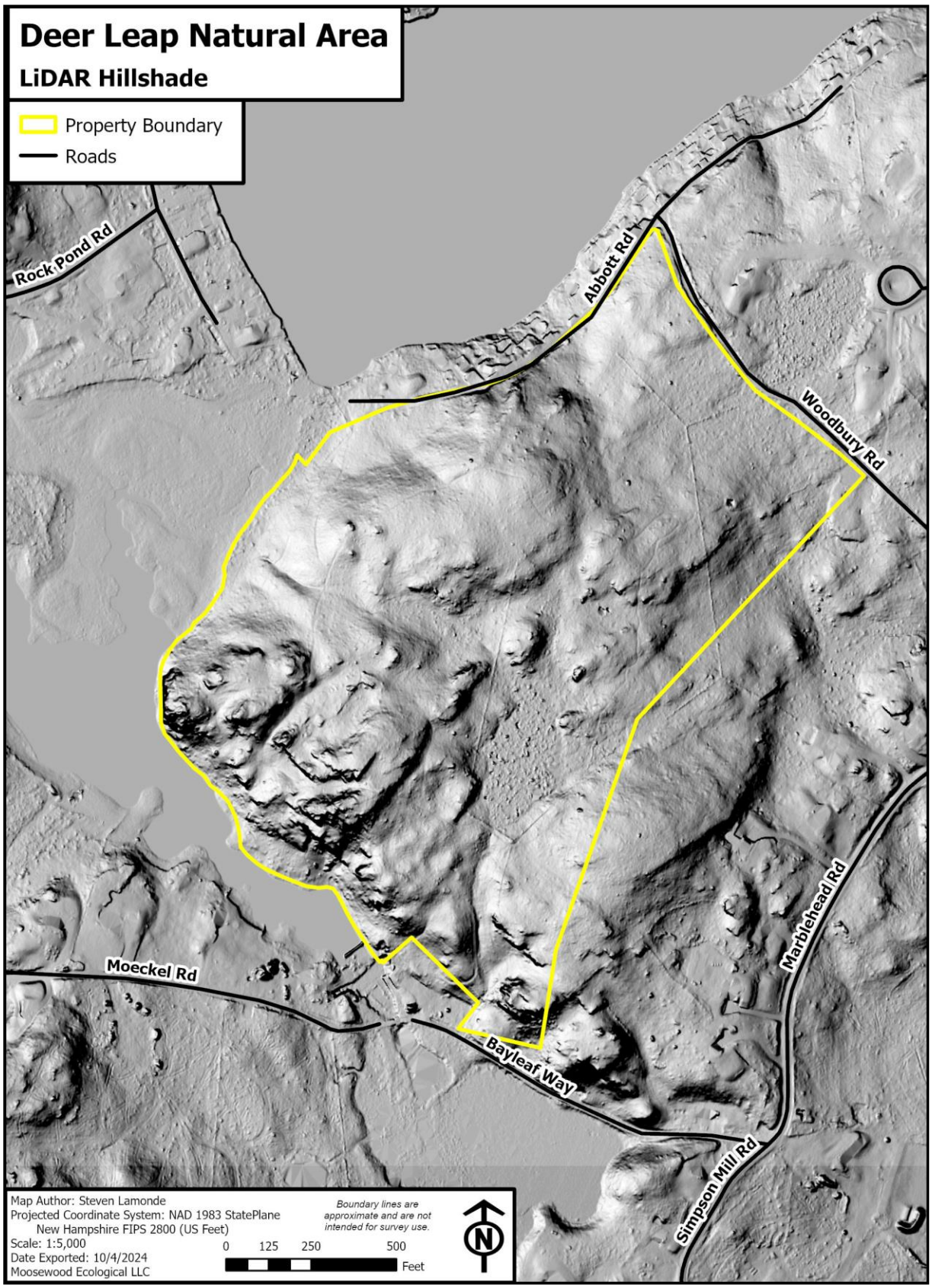

Figure 15. Deer Leap's ledges, stone walls, and cellar hole jump out in this LiDAR hillshade.

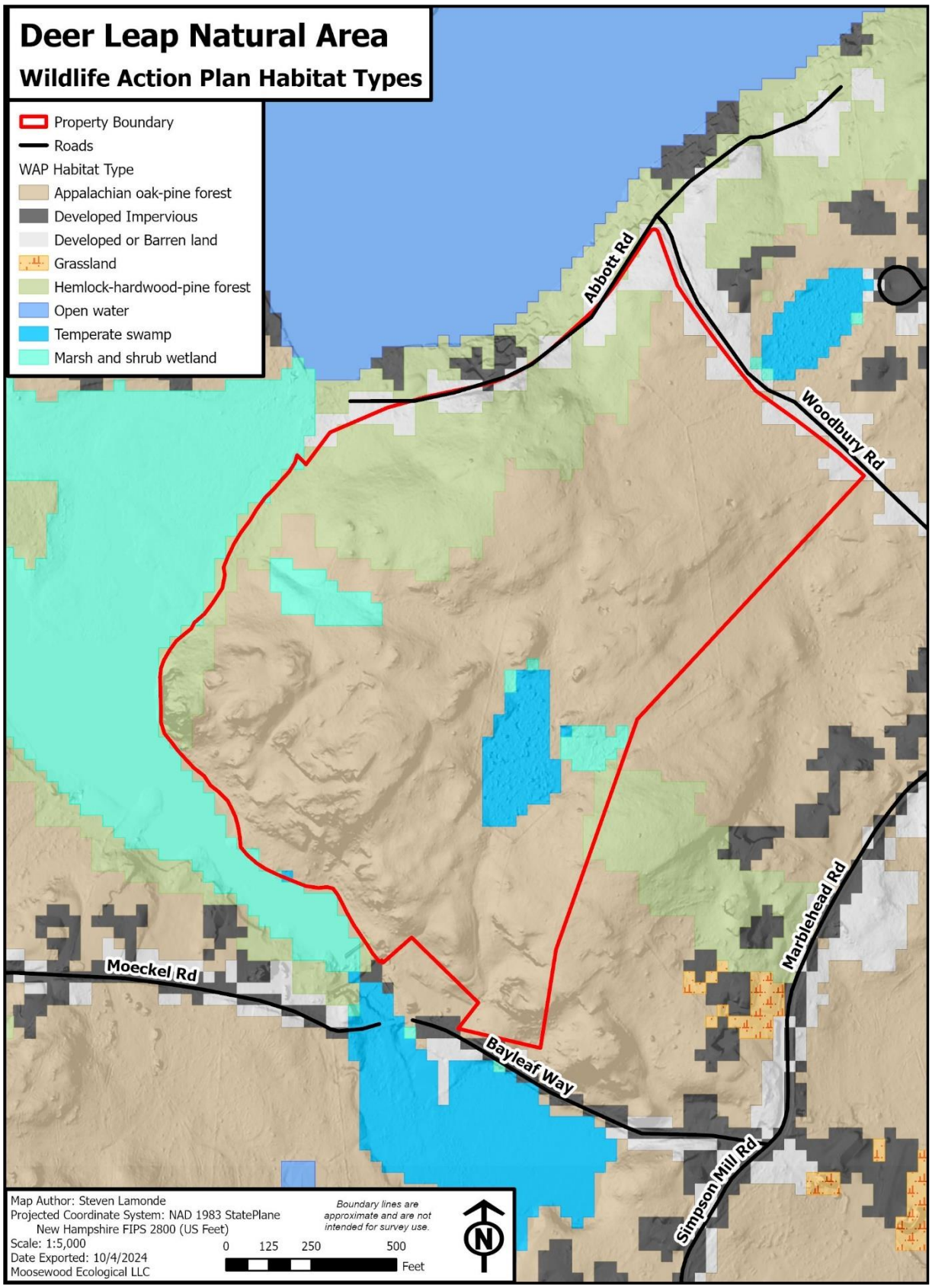

Figure 16. Deer Leap's proximity to several large wetlands contributes to its wildlife diversity.

Foster's Pond

Parcel: 1-C-2500
GIS-calculated area: 165.6 acres


White waterlilies at Foster's Pond Natural Area.

Created from a land purchase and subsequent acquisition of an abutting parcel in the 1980s and 1920, the Foster's Pond Natural Area now spans 165 acres of forests, wetlands, open ponds, and streams. Located in the northwestern part of Windham, this conservation area provides valuable protections for wildlife habitat, groundwater supply, and passive recreation. Relative to the other study areas investigated by this project, Foster's Pond appears to receive the heaviest amount of human use. A well-maintained trail system loops around both ponds and includes a section of the Rockingham Recreational Trail. The Nashua Road Recreation Complex also abuts Foster's Pond Natural Area and both sites share a large parking area. Through mindful stewardship a balance between ecological preservation and human enjoyment can be maintained at this site.

Geologic Setting, Topography, and Soils


One of several wetlands formed over poorly-drained soils at Foster's Pond.

Unique among the five study areas covered by this report, Foster's Pond presents evidence of past mining activity alongside the Rockingham Recreational Trail. The mining focused on the extraction of sand and gravel from glacial stream deposits. Elsewhere within Foster's Pond Natural Area, glacial till predominates the uplands and the larger wetlands, including Foster's Pond itself, consist of glacial swamp deposits (Table 24). Several prominent eskers exist within the southwestern section of the property, some of which have trails along their crest. Except for the eskers' steep embankments, this conservation area is topographically characterized as relatively flat with gentle slopes and minor hills. Foster's Pond conservation area rises to an elevation of about 350 feet at the northernmost property corner, and the lowest elevation of 245 feet occurs where the stream that drains Foster's Pond exits the property near the unnamed pond by Nashua Road.

The stony or rocky Canton, Chatfield-Hollis-Canton complex, and Scituate-Newfields complex soil types drain at least moderately well, whereas over 30 acres of poorly-drained Walpole very fine sandy loam occupies much of the low-lying areas (Table 25). These range of soil types present a diversity of growing conditions that host plants that specialize in drier sites as well as wetland-dependent plants.

Table 24. Geologic features of Foster's Pond Natural Area.

Bedrock geology	Berwick Formation (Silurian) - metasedimentary and metavolcanic rocks of the Merrimack Trough.
Surficial geology	Till (Pleistocene) - light- to dark-gray, non-sorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; contains some gravel. Glacial stream deposits (Pleistocene) - sand, gravel, and minor silt laid down by glacial streams during successive south to north ice positions. Generally less than 60 feet thick. Swamp deposits (Holocene) - muck, peat, silt, and sand. Generally 5 to 10 feet thick, but may be as much as 20 feet thick.

Table 25. Soil types and drainage classes at Foster's Pond Natural Area.

Soil Type	Acres	Drainage Class
Canton fine sandy loam, 15 to 25 percent slopes, very stony	0.5	Well drained
Canton fine sandy loam, 8 to 15 percent slopes, very stony	38.2	Well drained
Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	1.9	Well drained
Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	7.0	Well drained
Freetown and Natchaug mucky peats, ponded, 0 to 2 percent slopes	2.4	Very poorly drained
Hinckley loamy sand, 8 to 15 percent slopes	1.2	Excessively drained
Scituate-Newfields complex, 3 to 8 percent slopes, very stony	69.3	Moderately well drained
Walpole very fine sandy loam, 3 to 8 percent slopes, very stony	32.7	Poorly drained
Water	12.6	

Natural Communities

Similar to Clyde Pond and Gage Lands, Foster's Pond contains a mix of Appalachian oak-pine forest and hemlock-hardwood-pine forest ecosystems. Upland natural communities closely resemble dry Appalachian oak forest. Hemlock-beech-oak-pine forest dominates the tree composition and is relative to past land use history. Variations of this mixed hardwood-softwood forest community are present.

Wetland communities are widely scattered throughout Foster's Pond. These are associated with the emergent marsh-shrub swamp system. Natural communities typically include emergent marsh, aquatic bed, meadow marshes, shrub thickets, and tall graminoid marsh. Although these wetland communities are fairly common throughout New Hampshire they provide important

diversity of habitats and plants at Foster's Pond and Windham. This plant and community diversity also supports the many wildlife species.

We incidentally observed a total of 133 plant species at Foster's Pond Natural Area. Despite the presence of nine invasive species, many native plants occur. This list includes the State-Endangered downy arrowwood (*Viburnum rafinesqueanum var. rafinesqueanum*) and important food trees for wildlife (Table 26).

Table 26. Noteworthy plants observed at Foster's Pond Natural Area.

Species	**Noteworthiness**
Downy arrowwood (*Viburnum rafinesqueanum var. rafinesqueanum*)	State-Endangered (S1)
White ash (*Fraxinus americana*);	Species in rapid decline
American elm (*Ulmus americana*)	At-risk species from disease
Cardinal flower (*Lobelia cardinalis*)	High wildlife value
American hornbeam (*Carpinus caroliniana*)	Semi-enriched soils indicator
Basswood (*Tilia americana*)	Semi-enriched soils indicator
Black oak (*Quercus velutina*)	High wildlife value
White oak (*Quercus alba*)	High wildlife value
Glossy buckthorn (*Frangula alnus*)	Invasive
Autumn olive (*Elaeagnus umbellata*)	Invasive
Winged euonymus (*Euonymus alatus*)	Invasive
Garlic mustard (*Alliaria petiolata*)	Invasive
Great mullein (*Verbascum thapsus*)	Invasive
Japanese barberry (*Berberis thunbergii*)	Invasive
Norway maple (*Acer platanoides*)	Invasive
Oriental bittersweet (*Celastrus orbiculatus*)	Invasive
Purple loosestrife (*Lythrum salicaria*)	Invasive

Wildlife and Habitats

Appalachian oak-pine forest covers nearly two-thirds of the Foster's Pond Natural Area, while the rest of the property is evenly divided by hemlock-hardwood-pine forest, open water, and wet meadow/shrub wetland (Table 27). Trace amounts of temperate swamp, peatland, grassland, and developed areas also occur. Combined, these habitats support over 450 known species. Thanks to community naturalists and birders sharing their observations to iNaturalist or eBird, Foster's Pond represents one of the best-studied conservation areas from a biodiversity perspective. Among the five study areas, this site is marked as a public birding location within the eBird database. Accordingly, we were able to access four years of historical bird observations at this location, which contributed to this site's high bird diversity compared to the other sites. Twenty-three of the 97 bird species detected at Foster's Pond Natural Area are species of conservation

concern and include the Bald Eagle, Purple Finch, Rusty Blackbird, and Bay-breasted Warbler (Table 28). While not all bird species of conservation concern breed at Foster's Pond, the site provides important habitat for these species during migration or winter.

While this bird diversity serves as a highlight on its own merit, the discovery of two listed reptiles at Foster's Pond Natural Area proved more significant from an ecological standpoint. Numerous turtles were observed multiple times throughout the field season. One particularly productive turtle survey on April 20, 2023 yielded a count of 328 turtles, mostly Painted Turtles. Other significant wildlife features of Foster's Pond Natural Area include two confirmed vernal pools, four potential vernal pools, high wetland connectivity, and high mammal diversity. The presence of Bobcat and North American River Otter, two species that require tens of square miles of territory, suggest that Foster's Pond Natural Area remains connected to nearby natural landscapes. Although this property is heavily used for human recreation, the availability of many separate marshy wetland areas, open water sources, and forestlands away from trails provide opportunities for humans and wildlife to navigate the property with minimal conflict or disturbance.

Table 27. Wildlife Action Plan (WAP) habitat types at Foster's Pond Natural Area.

WAP Habitat Type	**Acres**	**Percentage**
Appalachian oak-pine forest	100.8	61%
Developed Impervious	0.0	<1%
Developed or Barren land	2.4	1%
Grassland	0.1	<1%
Hemlock-hardwood-pine forest	22.1	13%
Open water	19.3	12%
Peatland	1.5	1%
Temperate swamp	0.8	<1%
Wet meadow/shrub wetland	18.6	11%

Table 28. Summary of vertebrate species detected at Foster's Pond Natural Area. SGCN = Species of Greatest Conservation Need (WAP, 2020).

Observed amphibian species	American Toad, Eastern Red-backed Salamander, Gray Treefrog, Green Frog, Pickerel Frog, Spring Peeper, Wood Frog
Vernal pool obligates	Wood Frog
Amphibian SGCN	None detected
Observed bird species ***See Appendix I for full list***	95
Bird species of conservation concern	Wood Duck[1], American Black Duck[1,2,4], Chimney Swift[1,2,3,4,5], American Woodcock[1,2,4], Bald Eagle[1,2,4], Northern Flicker[1], Eastern Wood-Pewee[1], Barn Swallow[1], Brown Creeper[1], Veery[1,2,4], Purple Finch[1,2,4], Eastern

	Towhee[2,4], Rusty Blackbird[1,2,3,4], Common Grackle[3], Ovenbird[1], American Redstart[1], Northern Parula[1], Bay-breasted Warbler[1,2,4], Blackpoll Warbler[1], Black-throated Blue Warbler[1], Palm Warbler[1], Black-throated Green Warbler[1], Scarlet Tanager[2,4]
Observed mammal species	American Beaver, Bobcat, Common Raccoon, Deer Mice, Eastern Chipmunk, Coyote, Eastern Gray Squirrel, Gray Fox, North American Porcupine, Red Squirrel, North American River Otter, Striped Skunk, White Tailed Deer, Virginia Opossum
Area-sensitive mammal species	Bobcat, Coyote, North American River Otter
Mammal SGCN	None detected
Observed reptile species	Common Snapping Turtle, Northern Watersnake, Painted Turtle, and two rare species
Reptile SGCN	Two species

Bird Conservation Plans

1. Bird Conservation Region 14 (2006)
2. New Hampshire Wildlife Action Plan (2015)
3. Partners in Flight (2016)
4. New Hampshire Audubon (2020)
5. North American Bird Conservation Initiative (2022)

Left to right: Barred Owls (2), Common Raccoons (6), and Bobcat.

In addition to the many vertebrates that depend on Foster's Pond Natural Area for food, water, shelter, and space, we observed over 100 species on invertebrates without implementing any formal surveys for these small animals. At least three species represented the first publicly known occurrence of its kind in New Hampshire, and another seven species had never been publicly documented in Rockingham County before (Table 29). Rather than suggesting rarity, these discoveries more likely highlight a widespread lack of invertebrate documentation in the area. However, dragonflies and damselflies were thoroughly studied throughout New Hampshire during the first statewide dragonfly atlas (Hunt, 2012). Our documentation of an adult Beaverpond Baskettail (*Epitheca canis*) on May 11, 2023 at Foster's Pond helped fill an important gap in the range map for this species. We also observed a second Beaverpond Baskettail at Clyde Pond on May 14.

Table 29. Noteworthy invertebrates incidentally observed at Foster's Pond Natural Area.

Other Noteworthy Species	**Significance**
Liriomyza smilacinae	Second public record for Rockingham County
Beaverpond Baskettail (*Epitheca canis*)	First public record for Windham
Bog Leafhopper (*Helochara communis*)	First public record for Rockingham County
Hazel Blotchminer (*Cameraria corysella*)	First public record for Rockingham County
Macrodiplosis niveipila	First public record for Rockingham County
Eastern Catkin Fly (*Brachypalpus oarus*)	First public record for New Hampshire
Amber-marked Birch Leafminer Sawfly (*Profenusa thomsoni*)	Second public record for Rockingham County
Calycomyza flavinotum	First public record for Rockingham County
Nyholmia collaris	First public record for New Hampshire
Chirosia filicis	First public record for New Hampshire
Blaesodiplosis venae	Second public record for New Hampshire; first public record for Rockingham County
Black-sided Pygmy Grasshopper (*Tettigidea lateralis*)	First public record for Rockingham County

Selected photos (left to right): Beaverpond Baskettail, Eastern Catkin Fly, and *Nyholmia collaris*.

Left to right: Black-sided Pygmy Grasshopper, *Blaesodiplosis venae*, and *Chirosia filicis*.

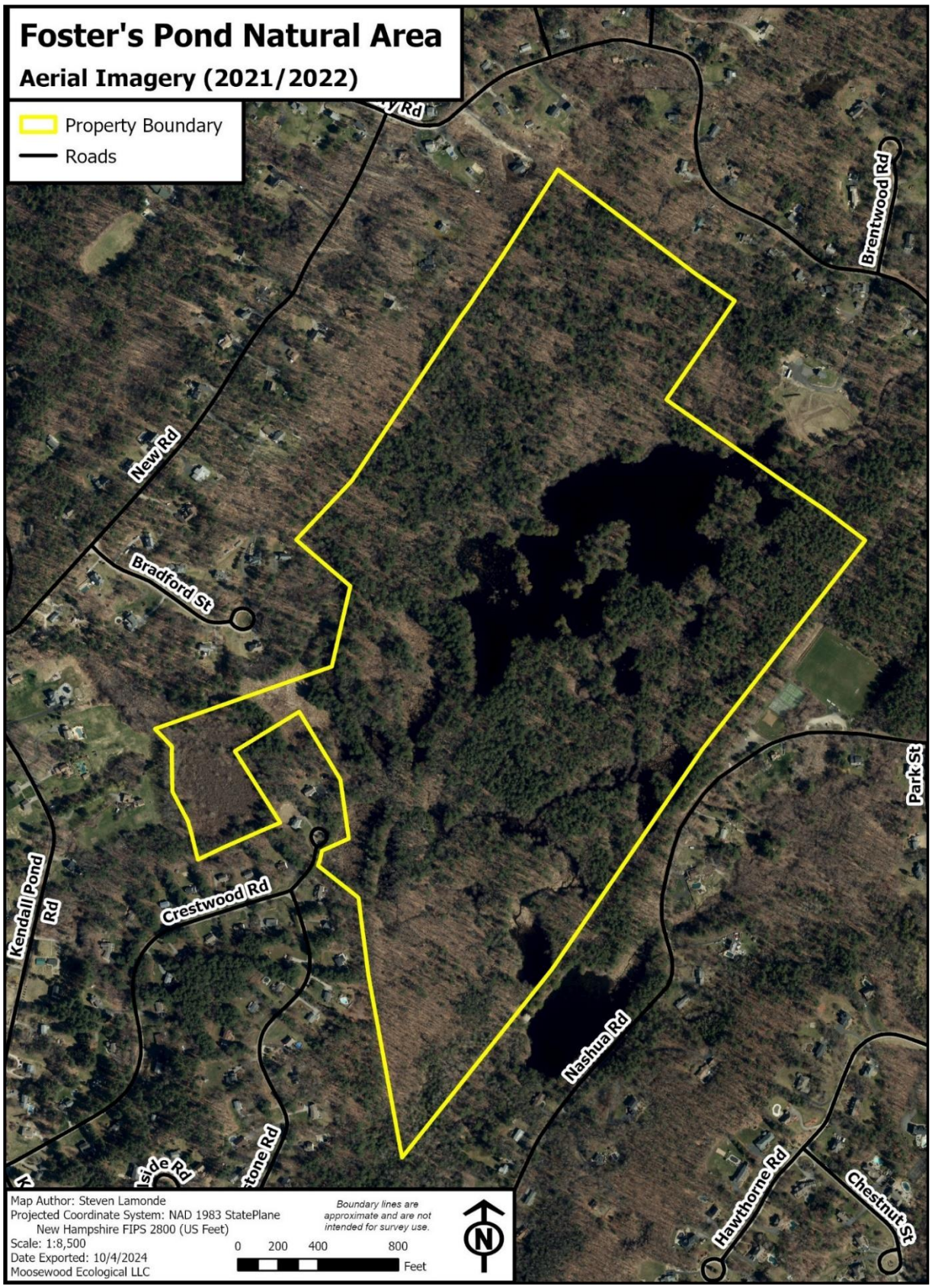

Figure 17. Aerial imagery of Foster's Pond depicting a diverse natural area amidst development.

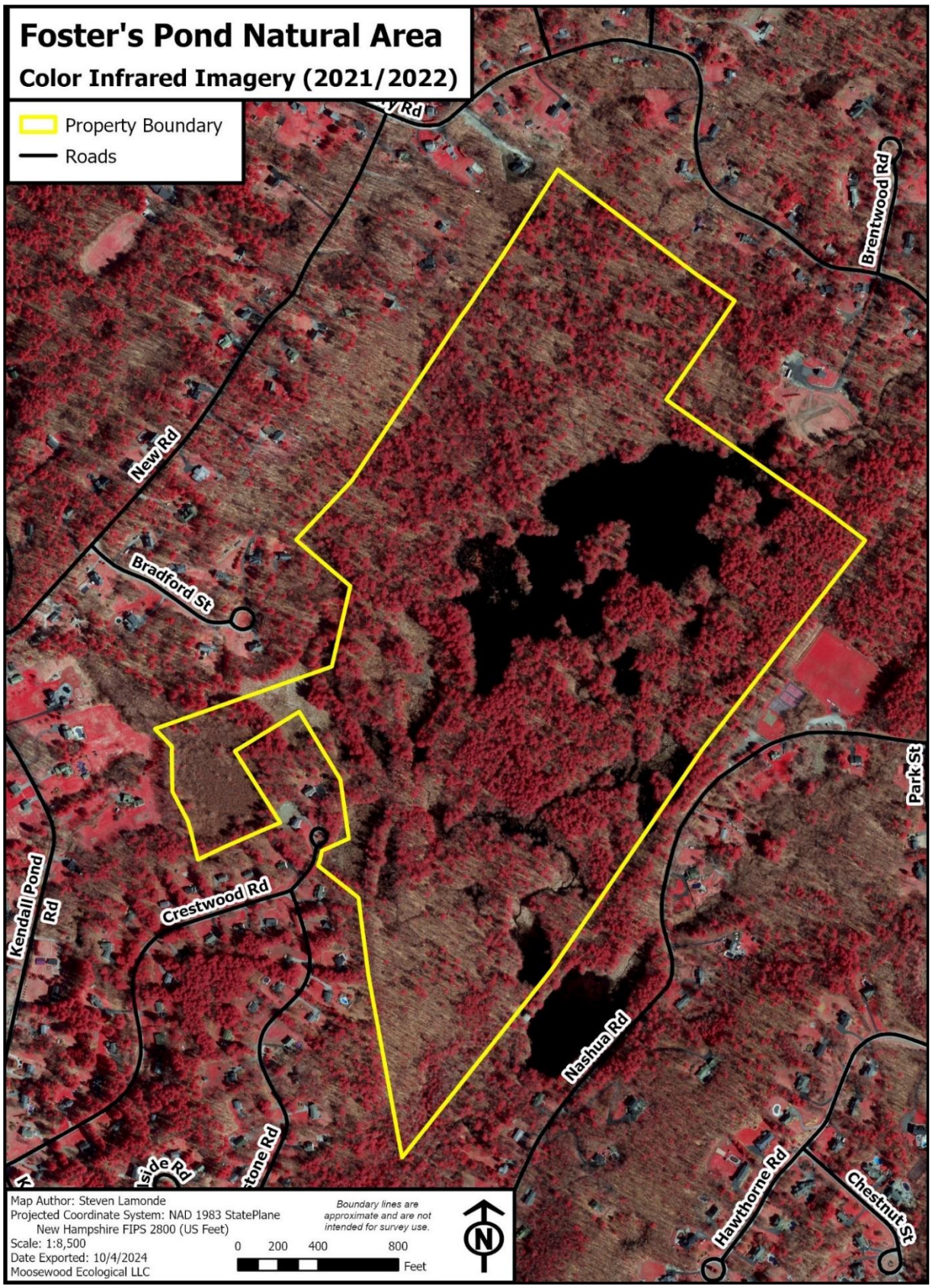

Figure 18. Color infrared imagery of Foster's Pond displaying varying wetland types and sizes.

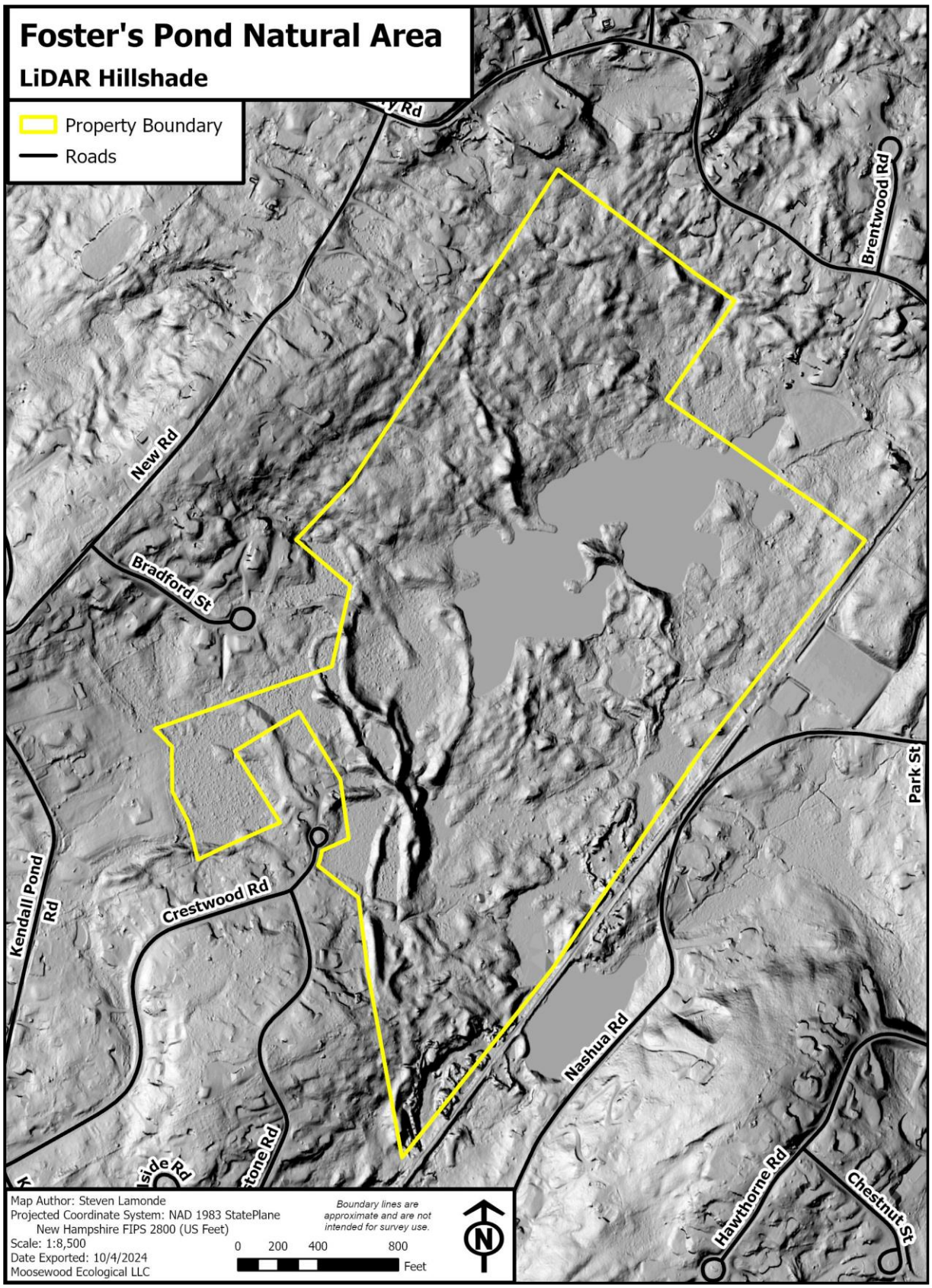

Figure 19. The LiDAR hillshade model highlights eskers and an old mine at Foster's Pond.

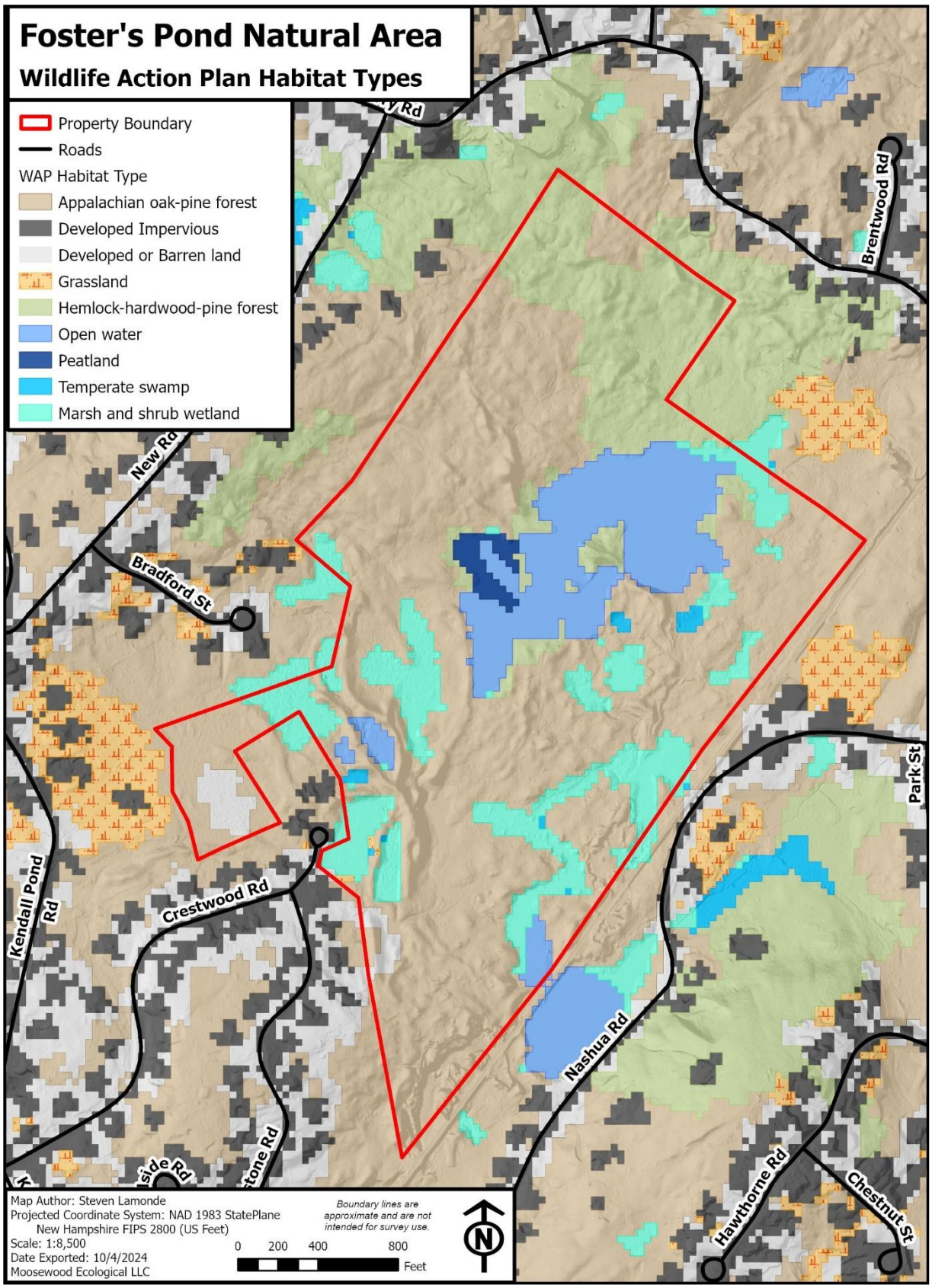

Figure 20. Foster's Pond high wetland density helps support a robust turtle population.

Landscape Assessment

Unfragmented Habitat 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 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 each Town-owned property, 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 500 feet on either side of existing roadways, including all state and town roads but excluding class VI roads and trails, as well as private roads and driveways. This 500-feet area is where most developments typically occur relative to roadways. Unfragmented blocks of land include a variety of natural habitats such as forests, wetlands, streams, and ponds, as well as some human-modified areas beneficial to some wildlife (e.g., hayfields, orchards).

Of the five focal properties, the Clyde Pond and Gage Lands conservation area is associated with the largest unfragmented habitat block, which measures 374 acres (Table 30 and Figure 21). For comparison, the Windham's largest unfragmented habitat block spans 1,300 acres and is partly conserved by the McIlvane conservation area. Deer Leap occupies the smallest block of unfragmented habitat at 92 acres, yet this patch is just west of the 1,300-acre McIlvane block and just north of 220-acre block in Pelham. The connectivity to nearby larger unfragmented habitat blocks allows for such area-restricted species as Coyote and Bobcat to still use the Deer Leap conservation area. Appendix III lists size requirements of habitat blocks for select wildlife.

Table 30. Associated unfragmented habitat blocks for each focal property.

Conservation Area	Associated Unfragmented Habitat Block	Bounding Roads
Ashton Woods	167 acres	North: Briar Road and NH-111; West: Faith Road and Atlantic Road; South: Castle Hill Road; East: London Bridge Road
Campbell Farm	117 acres	North: South School (Londonderry); West: Chase Road (Londonderry), Pleasant Drive (Londonderry), and Brookview Drive (Londonderry); South: Sirod Road; East: Kendall Pond Road
Clyde Pond & Gage Lands	374 acres	North: NH-11; West: London Bridge Road; South: Burnham Road; East: Bear Hill Road and Lowell Road
Deer Leap	92 acres	North: Woodbury Road; West: Moeckel Road and Jordan Road; South: Moeckel Ave (Pelham); East: Marblehead Road
Foster's Pond	174 acres	North: Londonderry Road; West: New Road and Millstone Road; South: Nashua Road; East: Nashua Road

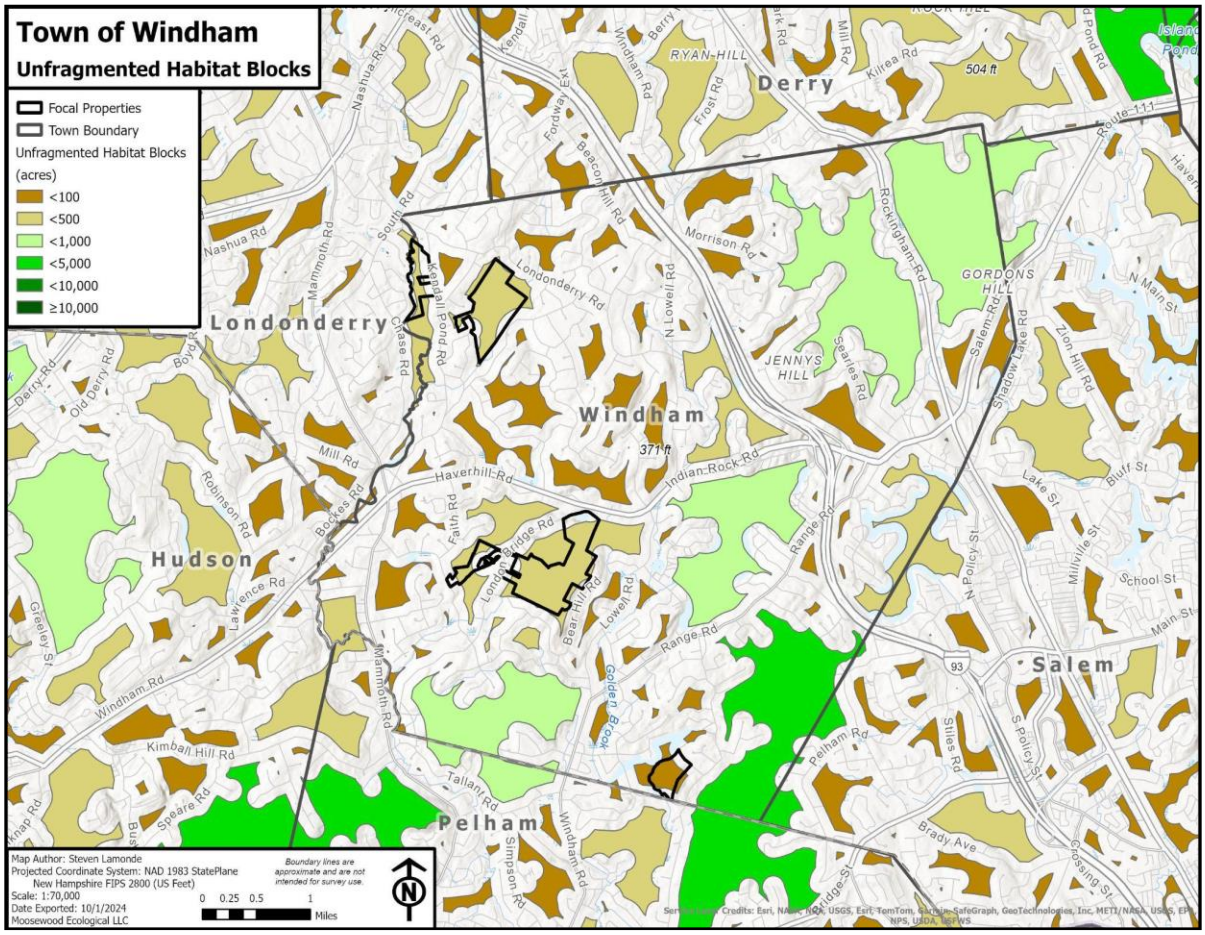

Figure 21. Few large unfragmented habitat blocks remain in the Windham area, yet the five focal properties help protect several of the small- to medium-sized blocks.

Highest Ranked Habitat by Ecological Condition

In addition to evaluating wildlife habitats across the entire state, the New Hampshire Wildlife Action Plan also identified where these habitats exist in the best ecological condition. This modeling accounted for biodiversity, arrangement of habitat types on the landscape, and lack of human impacts. With the goal of setting priorities for conservation of important wildlife habitat in New Hampshire, the Wildlife Action Plan also delineated areas with unusually pristine, influential, diverse, or exemplary habitats. This analysis also considered the ecological condition of each habitat type relative to the state and biological region, which resulted in a comprehensive tiered ranking of priority areas for conservation.

This analysis, repeated every five years and most recently updated in 2020, depicted all four habitat tiers among the five focal properties in Windham (Table 31 and Figure 22). They are:

- Highest Ranked Habitat in New Hampshire (Tier 1): Includes the highest-quality 15% of each habitat type in New Hampshire, with special emphasis on especially rare habitats, known locations of listed wildlife or plant species, and exemplary natural communities.
- Highest Ranked Habitat in Biological Region (Tier 2): Includes, by area, the top 30% of highest-ranked habitats within each biological region, except for areas already ranked as tier 1.
- Supporting Landscapes (Tier 3): Includes, by area, the remainder of the top 50% of each habitat type.
- Not ranked: Includes developed areas, natural habitats with a cumulative score outside of the top 50%, and small (<1 acre) patches of high-quality habitat surrounded by development.

The three top tiers are considered significant for wildlife and provide a helpful guide for land conservation at coarser spatial scales. However, at finer scales the state-wide analysis by New Hampshire Fish and Game did not universally include site-specific features (e.g., vernal pools) due to lack of data.

Table 31. Acreage of Wildlife Action Plan habitat tiers by conservation area.

Conservation Area	Tier 1 (acres)	Tier 2 (acres)	Tier 3 (acres)	Not Ranked (acres)
Ashton Woods	0	0	29.4	7.6
Campbell Farm	0	7.7	5.9	47.0
Clyde Pond & Gage Lands	0.1	0	11.5	216.5
Deer Leap	1.9	0	41.2	11.8
Foster's Pond	2.3	1.6	33.5	128.2

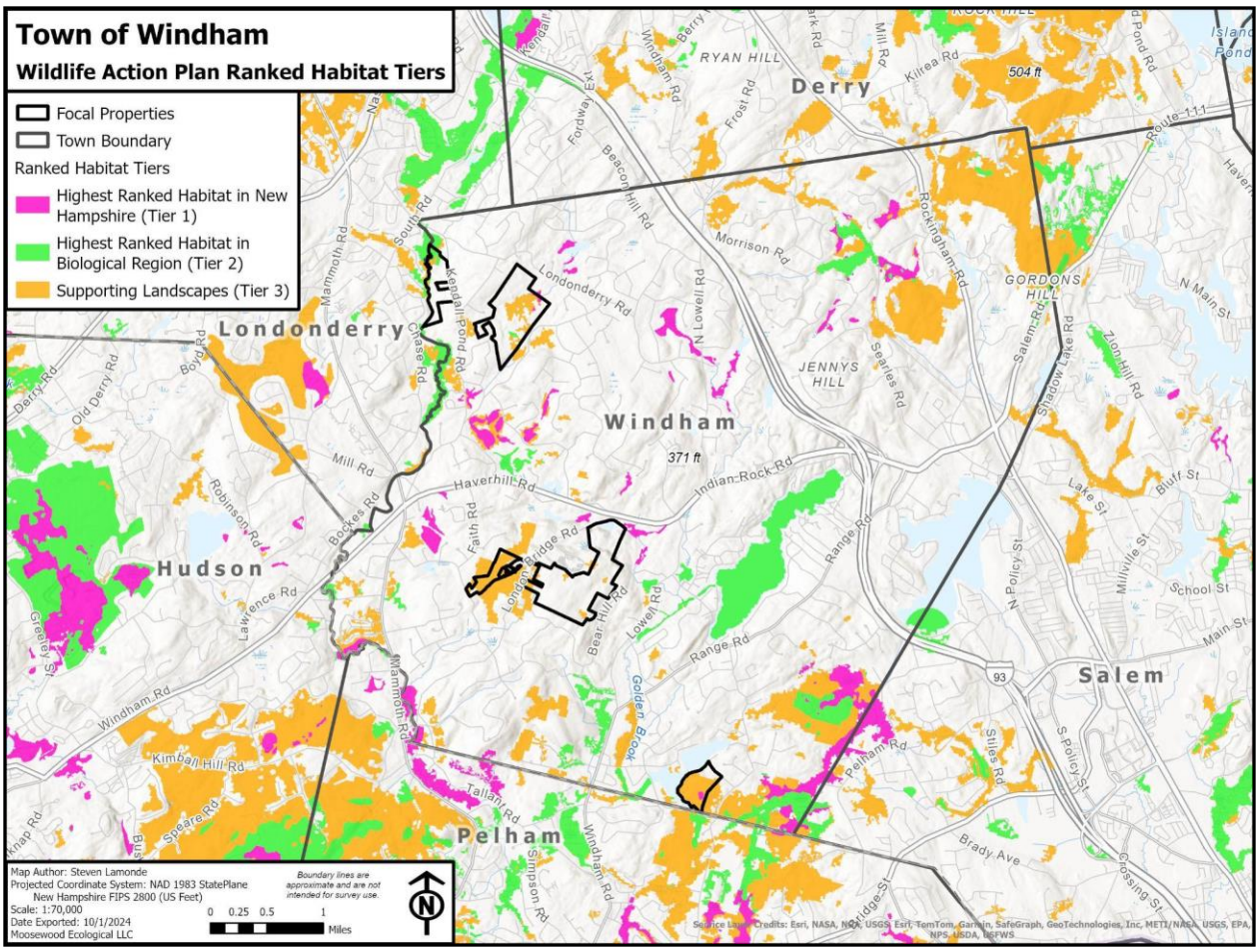

Figure 22. All five focal properties contain at least one of the top three Wildlife Action Plan habitat tiers.

Wildlife Corridors

Large unfragmented landscapes allow wildlife to migrate to new territories and to move among critical feeding, breeding, nesting, and overwintering habitats. Maintaining connectivity between critical habitats can provide permanent wildlife corridors within the built environment, enabling wildlife populations to survive. Wildlife must be able to travel safely throughout the landscape to meet their biological needs. Many animals depend upon a variety of habitats for their survival and may utilize several natural features for travel, including riparian zones of wetlands, ponds and streams, ridgelines, utility rights-of-way, and forest patches acting as a safe route between two or more habitats. A variety of wildlife species can be associated with these corridors, including North American River Otter, Muskrat, Gray Fox, Red Fox, Coyote, Bobcat, Moose, Fisher, Mink, and American Black Bear.

Wildlife corridors are not only significant for mammals but equally important for amphibians, reptiles, and aquatic species. Amphibians and reptiles begin to move from their wintering habitats to their respective breeding and nesting grounds in the spring. This is the time of year that most mortality can be noticed as these species travel across roadways in search of suitable habitats. This negative effect is repeated when the same individuals return to their wintering habitats. Thus, there is a great significance in maintaining habitat connectivity, as well as understanding where these patterns of movement are taking place. This latter point can be an important focus for both community education and awareness about wildlife corridors that cross roadways. Furthermore, knowledge of where wildlife consistently cross roadways can support measures to decrease potential road mortality and identify sites for road modifications, including bridges and culverts designed specifically for the safe passage of wildlife.

According to statewide modeling by New Hampshire Fish and Game, all five focal properties likely serve as important linkages within a complex network of wildlife corridors. From a local standpoint, the relatively large natural area associated with Clyde Pond and Gage Lands acts as a priority habitat block, or a site designated as a source of wildlife movement for the corridor model. This conservation land, as well as Ashton Woods, Foster's Pond, and Campbell Farm, contains large swaths of primary wildlife corridors (Figure 23). Deer Leap and Campbell Farm also overlap with secondary wildlife corridors. Modeled 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 considered individually. New Hampshire Fish and Game used 16 focal species for their analysis, which accounted for the movement habits of several turtles, snakes, mustelids, lagomorphs, North American Porcupine, Bobcat, and American Black Bear.

Both wetlands (left; Foster's Pond) and uplands (right; Campbell Farm) can function as wildlife corridors.

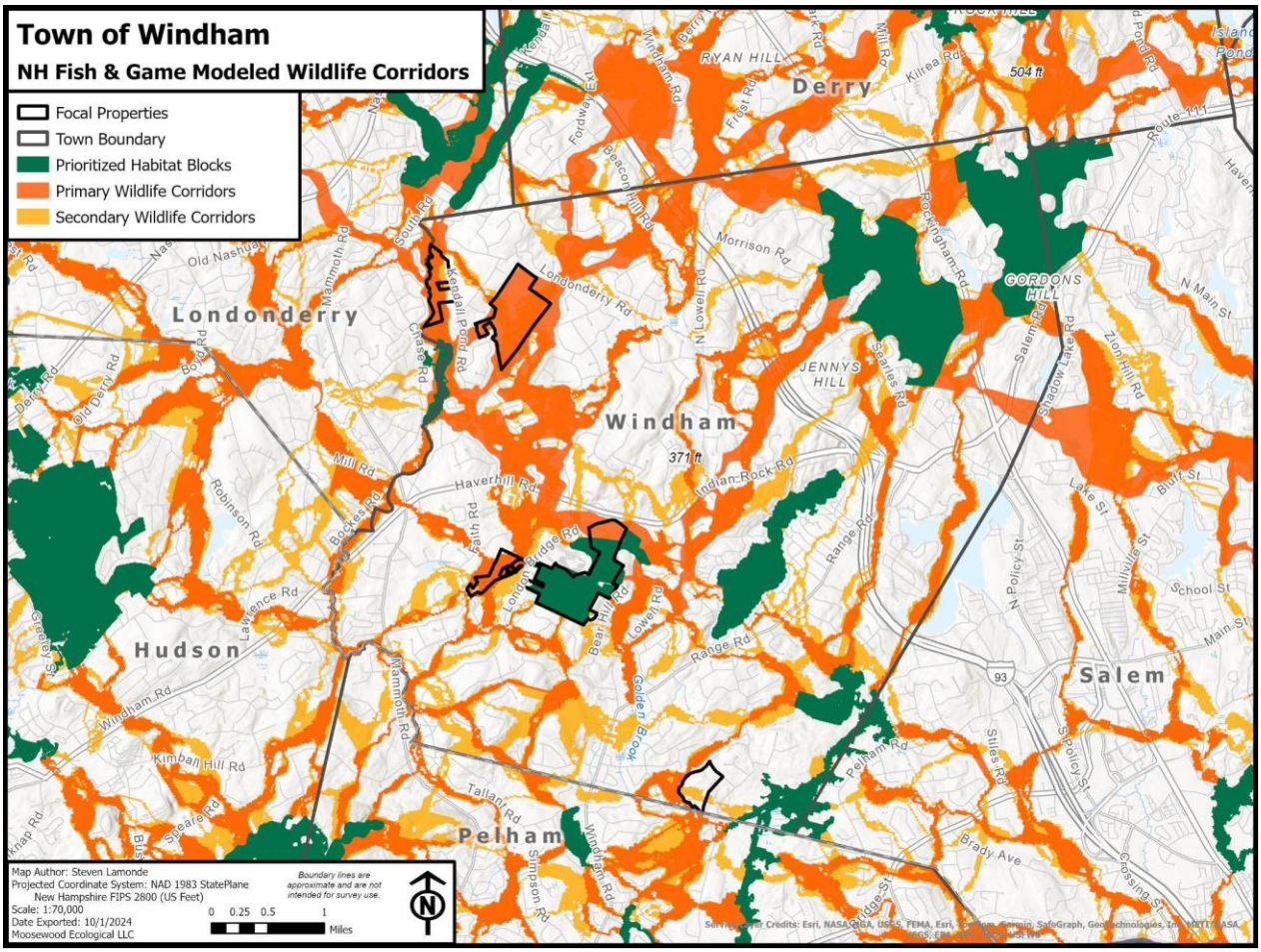

Figure 23. Modeled wildlife corridors highlight a complex network of animal movement throughout Windham as they access fragmented patches of intact habitat.

Issues and Threats

Invasive Plants

Few natural landscapes in southeastern New Hampshire are immune from human's impacts, and each of the five focal properties exhibit varying types of human-caused issues and at different degrees of severity. Invasive plants are the most prominent cause for concern at Ashton Woods, Campbell Farm, Clyde Pond and Gage Lands, Deer Leap, and Foster's Pond. Glossy buckthorn, multiflora rose, Japanese barberry, and winged euonymus (also called burning bush), readily occur across most focal properties while autumn olive, common buckthorn, oriental bittersweet, and Morrow's honeysuckle have established to a lesser extent on average. These represent just a handful of 85 non-native plant species documented in Windham to-date.

Fortunately, most non-native plants lack invasive tendencies and do not need to be prioritized for management. Invasive species pose the greatest risk to ecosystem health in places where they are established dense populations. The trailhead area at Foster's Pond is a good example of such a

site. Most invasive plants spread along forest edges, trail- and road-sides, and anywhere human activity exceeds light, passive recreation. Accordingly, invasive species may pose a more significant long-term threat to the natural systems at Foster's Pond, Clyde Pond, and the Gage Lands. While invasive plants have also taken a lighter hold at Campbell Farm and Ashton Woods, these properties currently experience less human traffic and thereby have a lower long-term risk from invasive plants.

Forest Pests and Pathogens

Historically, elms and chestnut trees were once a major component of New England forests yet both species rapidly declined following the accidental introduction Dutch elm disease and chestnut blight, to the United States. While young specimens of American elm and American chestnut can still be found in Windham, the introduced pathogens kill them before reaching maturity. Very rarely does one of find a native elm or chestnut that produces seeds. New Hampshire is facing new pathogens, and pests, usually non-native insects, are also changing the makeup of New Hampshire's forests. At the Gage Lands, we found a new outbreak of Beech Leaf Disease (*Litylenchus crenatae*), a microscopic nematode that creates a light- and dark-striped pattern on beech leaves. The affected leaves die partway through the growing season, reducing a tree's ability to photosynthesize. In Ohio, where this pest has been present for 12 years, Beech Leaf Disease appears to kill mature beech trees within three to five years. Beech Leaf Disease first arrived in New Hampshire in 2021 and has since spread to more than 100 Granite State towns. Other forest pests already having an impact on Windham's forest health include the Emerald Ash Borer (affects ash trees), Hemlock Woolly Adelgid (affects hemlocks), Elongate Hemlock Scale (affects hemlocks), and Beech Bark Canker (affects American beech).

Dumping and Littering

While infrequently observed over the course of our field surveys, we unfortunately found several instances of recent, improper disposal of waste and organic matter. In addition to finding and removing multiple popped mylar balloons from the five focal properties, more significant infractions included a flatscreen television dumped near the Clyde Pond parking lot, an old metal ladder tossed over a stone wall boundary at Gage Lands, and occasional piles of garden trimmings and lawn clippings on the Town-owned side of Gage Lands' southern property line. Minor littering of cans, bottles, and other small items was observed along the rail trail at Foster's Pond, whereas numerous plastic items and other discarded items were found within Campbell Farm's wetland system along Beaver Brook. We suspected many of the sports-related items found at Campbell Farm originated from the South Londonderry School located less than 1,000 feet upstream, but they may also have come from any of the many private residences that abut the river.

Beavers

At the specific request of the Windham Conservation Commission, we sought to address concerns about the water level of the unnamed pond adjacent to Foster's Pond Natural Area. Located on the east side of the Rockingham Recreational Trail, this pond receives inflow from the stream that drains Foster's Pond and is also dammed by beavers at the southern end. It is unknown if the entire pond exists because of the beaver dam or if the dam has only increased the pond water level. Where beaver ponds and human development occur in close proximity, conflicts often arise and can range in severity from the perceived threat of losing a planted tree to the destruction of private or public infrastructure from catastrophic washouts after a dam failure. Humans have responded in various ways, sometimes killing beavers, trapping and relocating beavers, or repeatedly breaching dams. Fortunately, less drastic measures can be taken to reduce property damage from beavers. A primary example of this is the beaver deceiver device, which, once installed, maintains a constant water level in beaver ponds.

Maintaining a constant water level at an elevation that allows for continuous flow from the culvert underlying the Rockingham Recreational Trail may be ideal. This height would prevent erosion of the trail embankments while providing aquatic life, particularly rare turtles, with enough water depth to support their needs. Other benefits of the beaver pond include:

- Improving hydrologic conditions for wetlands and soils through water storage
- Increasing recharge rates of groundwater aquifers
- Increasing wetland and riparian habitats
- Providing habitat for numerous species of conservation concern, in addition to the rare turtles occurring within Foster's Pond Natural Area
- Providing refugia for wildlife impacted by climate change, including migrating animals
- Improving water quality by capturing sediments, nutrients, and pollutants
- Mediating floodwater flows following intense rain events
- Sequestering and storing significant amounts of climate-warming carbon dioxide

Impacts to Biodiversity

Development

The conversion of natural landscapes to development and other non-natural land uses represents one of the largest drivers of biodiversity decline. In addition to the direct loss of habitat, development can also interfere with wildlife movement, behavior, and other secondary impacts. Species that are rare, dependent on a specific habitat type, or require large territories typically feel the impacts from development sooner than species that are common, flexible with habitat preferences, or capable of finding all their necessary resources within a small area. Scientific studies have long documented the deleterious environmental impacts of development that extend far beyond a road's or building's physical footprint. For example, as of 2011, roads covered 1%

of the American landscape but created a developmental pressure on nearly 20% of the country's land area (Clevenger and Huijser, 2011). As the population of New Hampshire continues to show significant growth (Johnson, 2023), it becomes increasingly important to understand and manage both likely and potential impacts of development on wildlife and ecosystems. While the following is not an exhaustive list, some of the primary concerns with development in sensitive areas include:

- Loss of habitat
- Temporary or permanent disruption of wildlife corridors
- Temporary or permanent change in wildlife behavior
- Increase in colonization by invasive species
- Fragmentation of habitat
- Increase in edge effects (e.g., drier soil, increased littering, increased noise pollution)
- Reduced genetic exchange between subpopulations
- Increase in runoff due to impervious surfaces
- Increase in chloride concentrations in road-adjacent waterways
- Alteration from natural drainage patterns
- Reduced area of interior, or core, habitat

While the risk of development occurring on any of the five focal properties is low, the biodiversity within these natural areas will continue to feel the pressures of nearby development. This could range from a single-family house being built on an abutting property to the loss of a significant natural area over a mile away. The first scenario might increase noise pollution and reduce the area of core habitat among other impacts, whereas the second scenario would weaken habitat connectivity, potentially disrupt wildlife corridors, and require area-sensitive species to travel even farther to find the resources necessary to sustain themselves and reproduce. The risks and threats faced by wildlife and ecosystems from development pressures underscore the importance of implementing effective avoidance or mitigation measures to minimize negative impacts on biodiversity. More information and resources describing the impacts of development on wildlife are listed in the *Literature Cited and other Resources* section of this report.

Recreation

While recreation in natural ecosystems, conserved or not, can promote environmental stewardship and foster a deeper connection with nature, it also has the potential to degrade habitats, disturb wildlife, and disrupt ecological processes (Primack and Terry, 2021). Proper recreation management actions, including public education, can mitigate these impacts to some extent. Two of the primary recreational pressures on wildlife and ecosystems are property overuse and the creation of social or rogue trails, particularly in popular and easily accessible conservation areas (Bradford and McIntyre, 2007). High visitor numbers can lead to trail compaction, soil erosion, habitat destruction, littering, and conflicts between visitors and

wildlife. Additionally, certain recreational activities may introduce non-native species or pathogens, leading to the spread of invasive species and diseases that can harm native flora and fauna. A good example of this is the introduction of invasive plant species through seeds stuck to shoes or off-road vehicles, including bicycles (Wells et al., 2012).

Wildlife at heavily-used conservation areas such as Foster's Pond and Clyde Pond, and to a slightly lesser extent the Gage Lands, may be facing more disturbances than wildlife at Deer Leap, Ashton Woods, and Campbell Farm. While this study did not investigate any long-term impacts of trails on the ecosystem, we did observe signs of erosion within and adjacent to trails at Foster's Pond and Clyde Pond. Trails located on steep slopes or those more popular with mountain biking showed the most erosion. Future management of biking and other recreational pressures on natural ecosystems requires a balanced approach that considers both environmental conservation and visitor enjoyment. Strategies may include:

- Visitor education and outreach programs
- Seasonal trail closures to limit erosion or protect breeding wildlife
- Designing and maintaining sustainable recreational infrastructure
- Improved trail design and consistent maintenance
- Enforcing regulations and monitoring compliance
- Local collaboration to develop management plans with community buy-in
- Investing in assessments of the ecological impacts
- Creating and maintaining adaptive management strategies

The many people Moosewood Ecological observed and spoke to about their enjoyment of Windham's Town-owned conservation areas, expressed common themes of "getting out in nature," "natural beauty," "scenic/aesthetic views." By addressing recreational pressures proactively and collaboratively, the five focal properties can continue to provide valuable recreational opportunities while safeguarding their ecological integrity for future generations to enjoy.

One excellent local resource for handling trail planning is New Hampshire's *Trails for People and Wildlife* (Stevens and Oehler, 2019), a guide and mapping tool funded by the US Fish and Wildlife Service and developed by the NH Fish and Game Department and Great Bay National Estuarine Research Reserve. Its purpose is to encourage outdoor activities while minimizing negative impacts on wildlife. The guide offers principles for trail placement, emphasizing the avoidance of sensitive areas and utilizing GIS mapping tools to find optimal trail routes. It also discusses considerations for various types of land use and community perspectives. The tool has been well-received and implemented in such projects as the Southeast Land Trust's Stonehouse Forest and Deerfield Conservation Commission's conservation easements. The *Trails for People and Wildlife* handbook is available for download and can be used by both landowners and

professionals to plan new trails or adjust existing ones to balance human recreation and wildlife conservation. Furthermore, because this resource identifies sensitive ecological areas, the Trails for People and Wildlife dataset can be used to preliminarily gauge ecological impacts from any form of development.

Ashton Woods, Campbell Farm, Clyde Pond and Gage Lands, and Foster's Pond all have areas where potential trails would have a very high impact on the ecosystem (Figures 24, 25, 26, and 28). These highly-sensitive ecosystems consist mostly of wetlands, where foot traffic can rapidly destabilize the soil, over-compact organic matter, and cause other changes to the substrate that would result in a loss of wetland plants. Additional impacts would be felt by wildlife that use wetlands, from turtles to songbirds, as these animals would pause their normal behavior or even flee as humans passed by. Accordingly, trail impact increases the closer one gets to a wetland. Deer Leap is the only property without areas of "very high" trail impact (Figure 27), although this natural area contains multiple high-impact areas near the few wetlands and steep ledges, of which the latter's shallow soils are more prone to long-term damage than the thick, moist, loamy soils found on flatter terrain. Despite this prevalence of highly-sensitive ecosystems at each of the five focal properties, opportunities for environmentally-conscious trail development exist (e.g., the uplands at Campbell Farm).

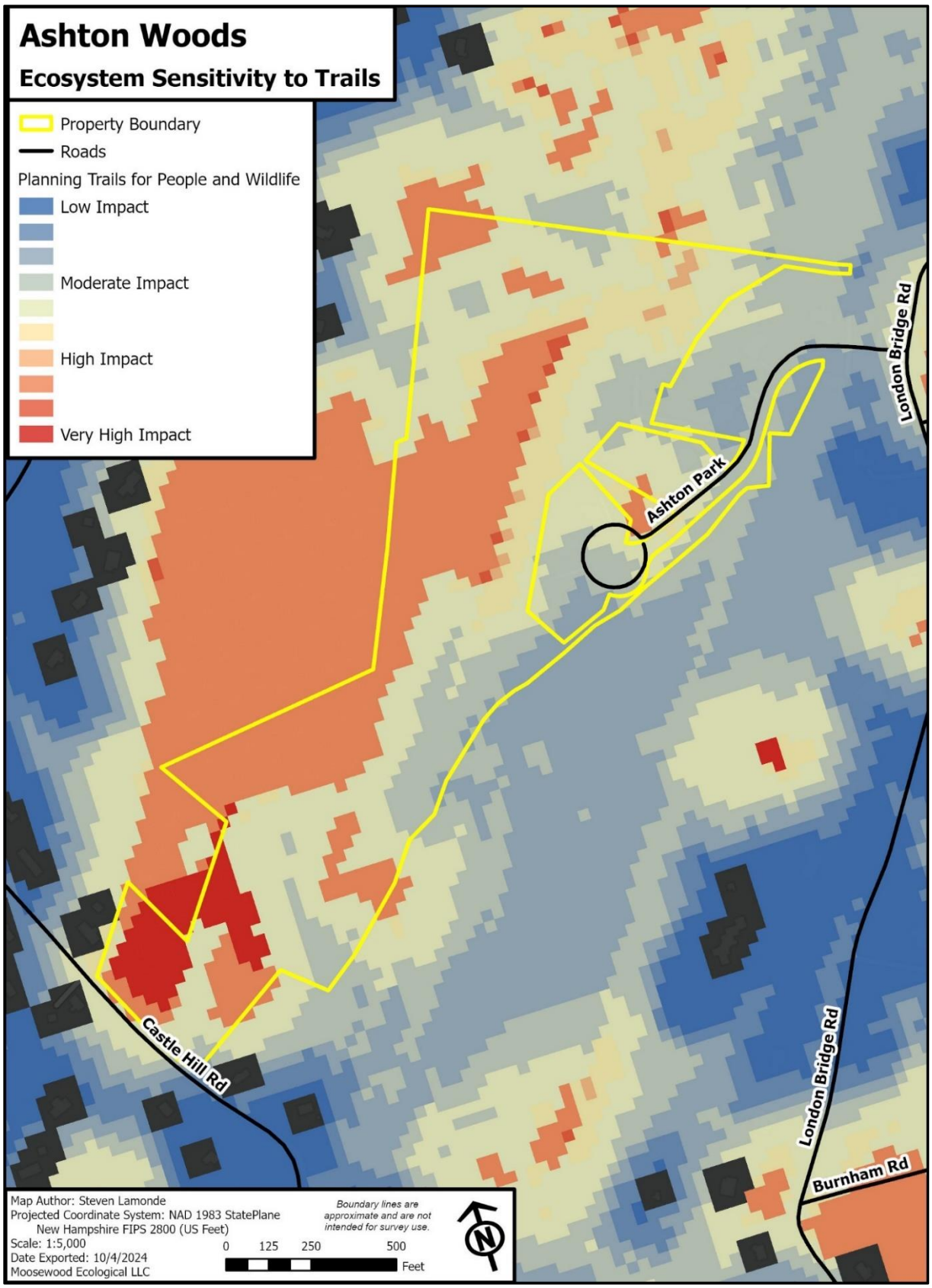

Figure 24. Modeled ecosystem impact from trails if they were to be expanded at Ashton Woods.

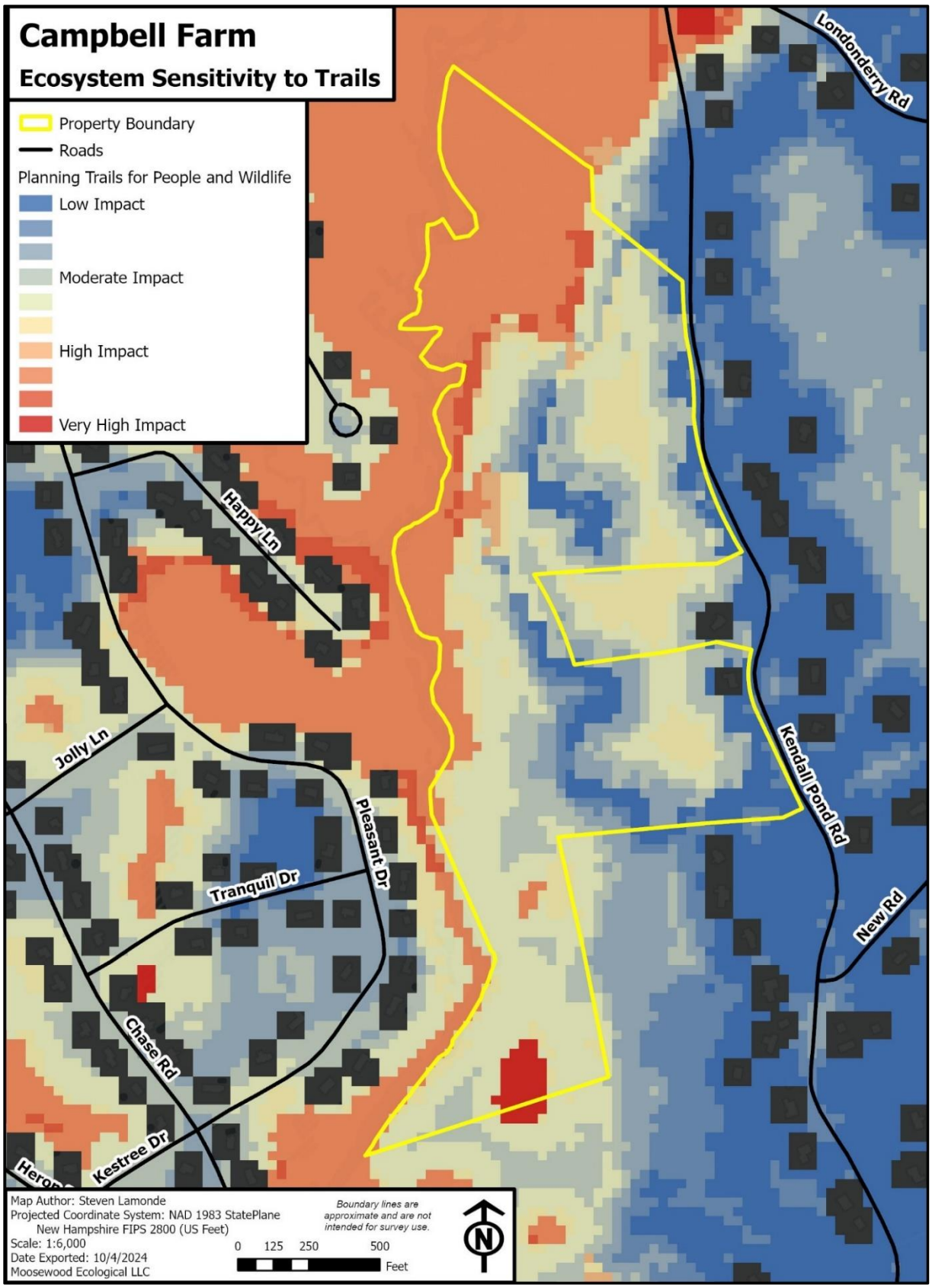

Figure 25. Modeled ecosystem impact from trails if they were to be recreated at Campbell Farm.

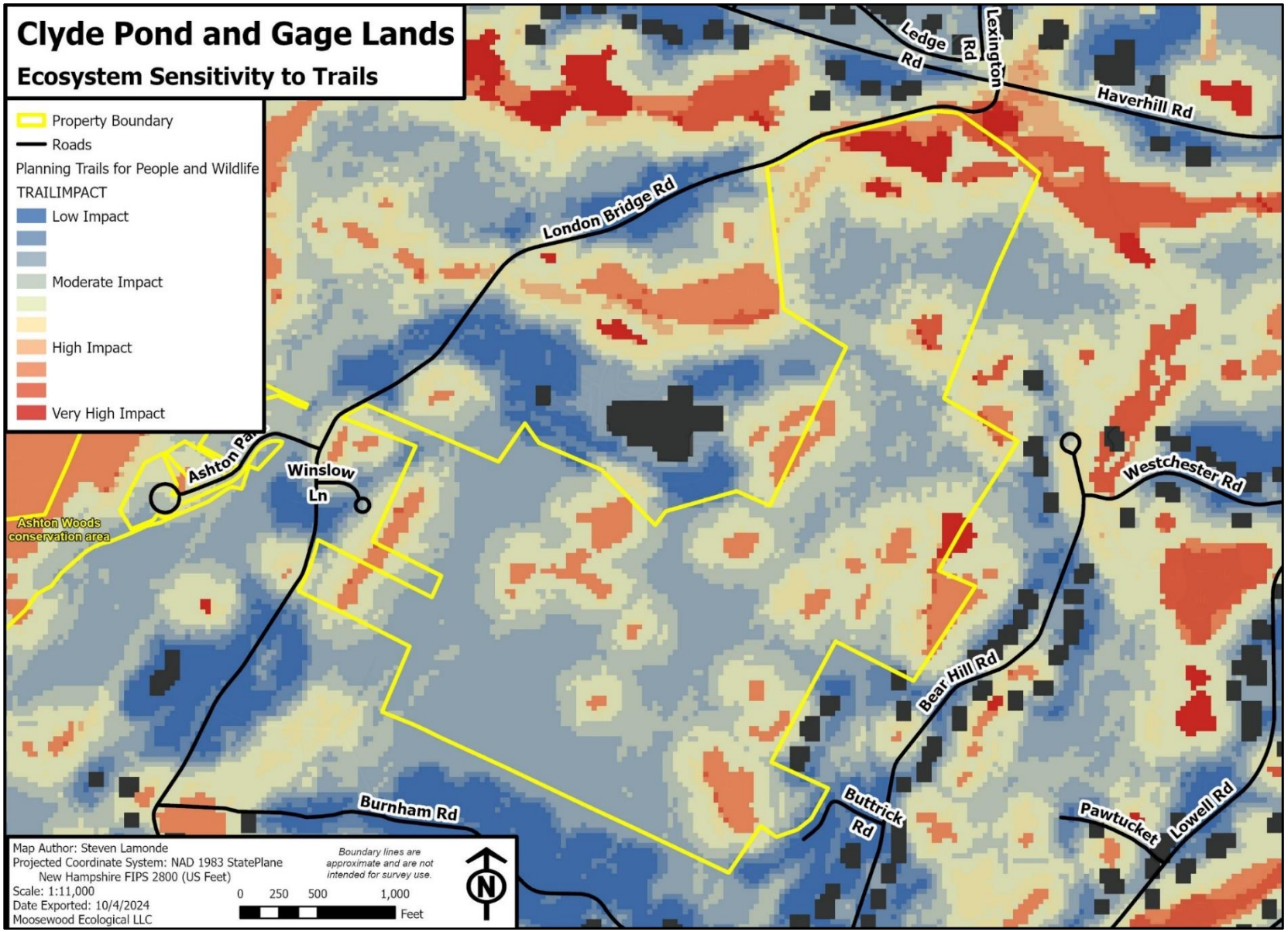

Figure 26. Modeled ecosystem impact from trails if they were to be expanded upon at Clyde Pond and Gage Lands.

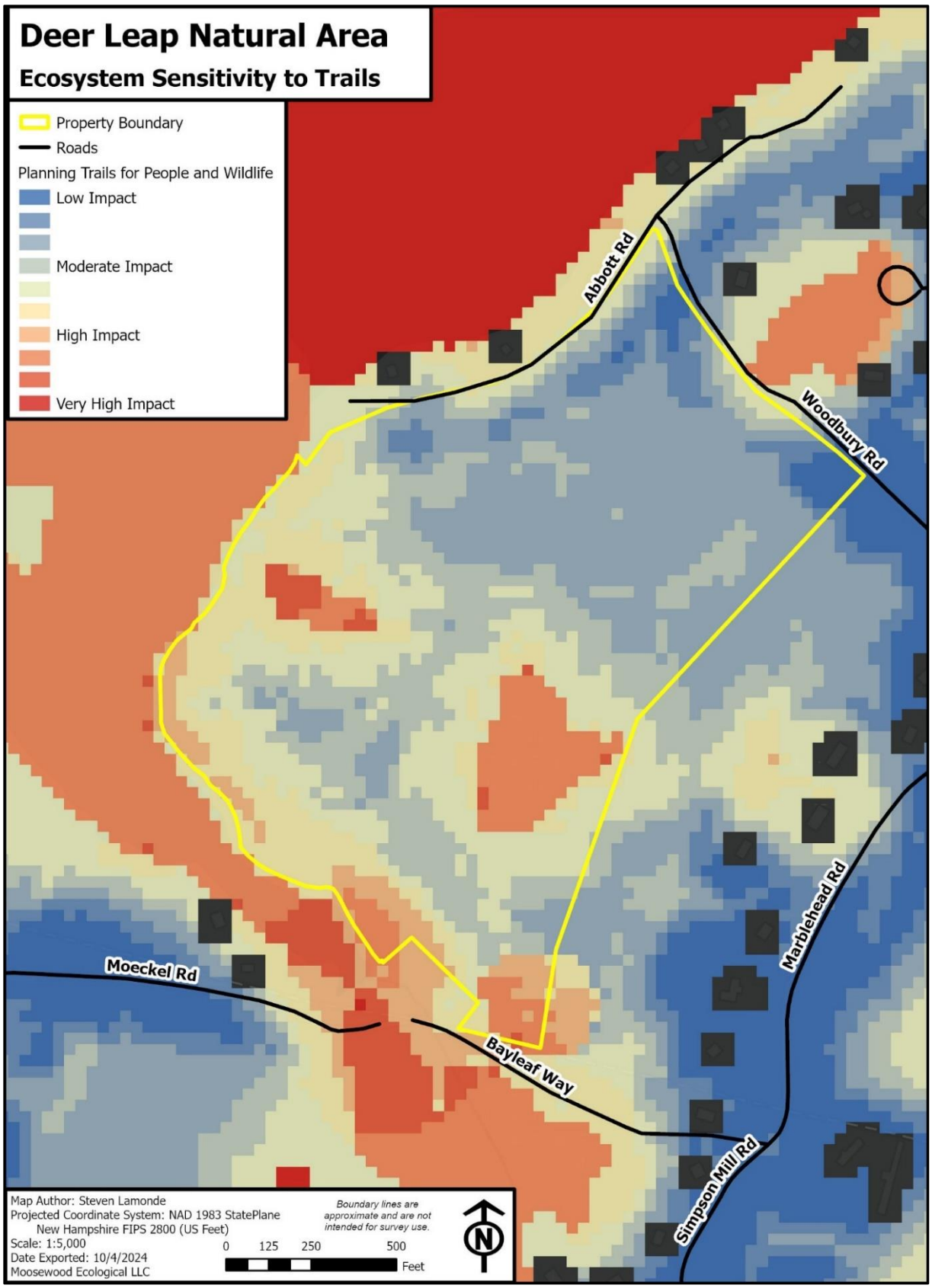

Figure 27. Modeled ecosystem impact from trails if they were to be expanded upon at Deer Leap.

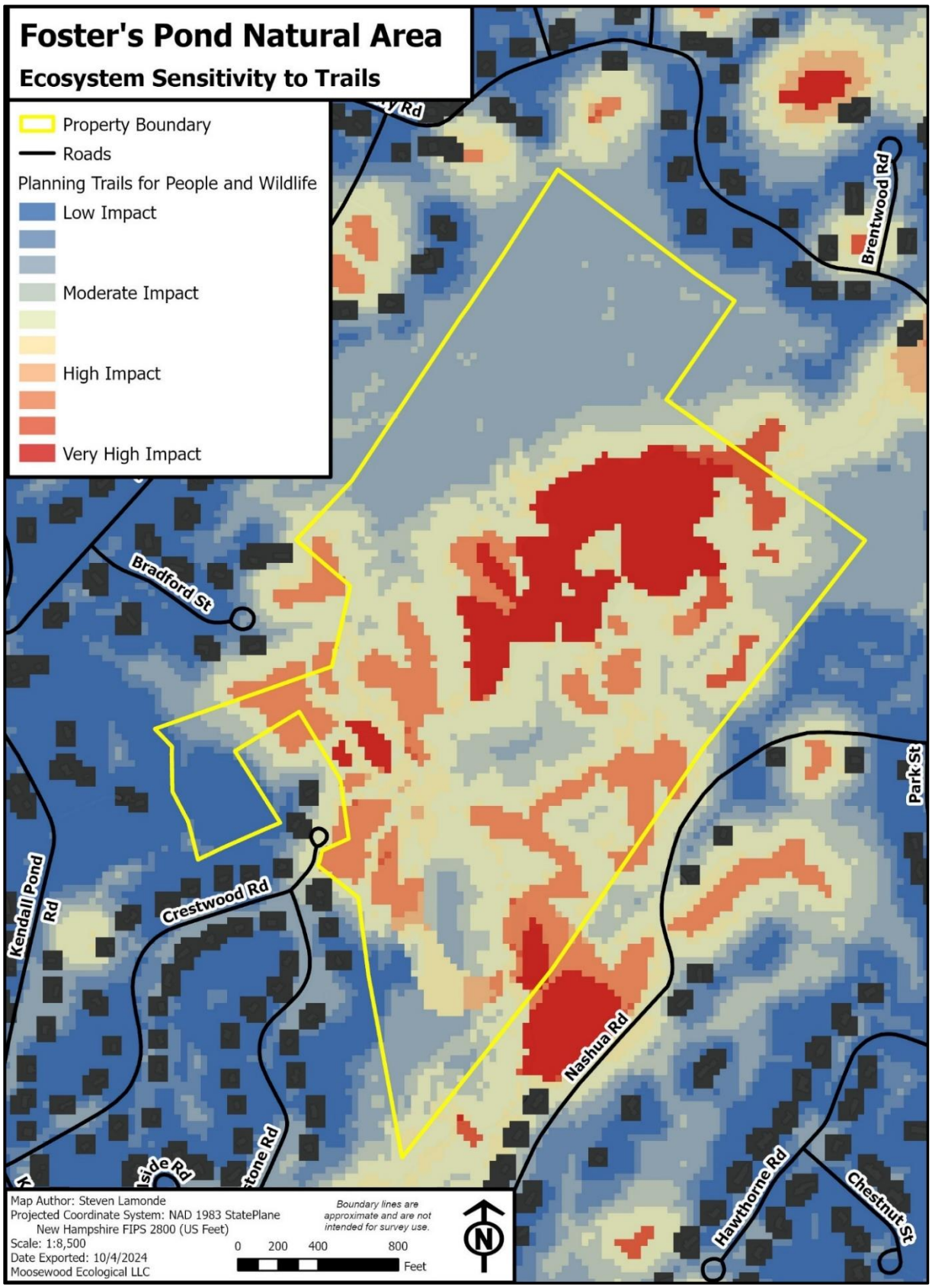

Figure 28. Modeled ecosystem impact from trails if they were to be expanded at Foster's Pond.

Climate Change

The flora and fauna that call Windham home have found their ecological niche within the town's specific combination of climatic conditions (e.g., long-term temperature and weather trends). Windham's modern-day biodiversity has slowly adapted and evolved in response to an ever-changing climate. Due to humans' rapid warming of Earth's atmosphere through the burning of fossil fuels, the pace of climate change has increased too quickly for some species to adapt, and this is causing widespread extinctions across the planet.

Windham will likely experience "local extinctions" as northern-adapted plants slowly die off in response to warming temperatures. Similarly, wildlife that favor cooler temperatures or depend on northern-adapted plants will gradually shift their geographic range northward. At the same time, southern species once uncommon in New Hampshire may become more abundant. A recent example of this is the Carolina Wren (*Thryothorus ludovicianus*), which did not live in New Hampshire as recently as the 1980s and now thrives virtually everywhere south of the White Mountains.

While an ultimate prediction of change over time can provide long range predictions, there are elements that can be realized for the near future. Specific to Windham, the following changes will or most likely occur at Ashton Woods, Campbell Farm, Clyde Pond and Gage Lands, Deer Leap, and Foster's Pond.

- Gradual loss of white ash and eastern hemlock as these trees become stressed by increasing temperatures and succumb to introduced forest pests.
- Increase in abundance of southern plant species, including generalist such hickories, oaks, and other herbaceous vegetation that can occupy generic sites.
- Reduction of American beech tree density following the spread of Beech Leaf Disease.
- Reduction of specialist species and increase of generalist species, including both rare and common species.

Community Outreach Summary

In addition to field work and ecological assessments, this project also dedicated time for involving the local community and raising awareness about local biodiversity by hosting two bioblitz events and an evening presentation. A bioblitz is a community science activity that combines novice and expert naturalists to record as many species of plants, animals, and fungi as possible within a constrained time period and area. Additionally, using the international community science platform *iNaturalist*, we established the Windham Biodiversity Project (https://www.inaturalist.org/projects/windham-nh-biodiversity-project), which summarizes and catalogs all wildlife, plant, and fungi observations that are submitted to iNaturalist within the Town of Windham. As of September 2024, the Windham Biodiversity Project contains over

4,500 observations of more than 1,100 species. Nearly 300 people have contributed to this project.

To promote the Windham Biodiversity Project and raise greater awareness about Windham's amazing wildlife and plants, Moosewood Ecological hosted the first bioblitz on the weekend of May 20 and the second on July 29. For the May bioblitz, nine participants added 547 observations of 293 species to the Windham Biodiversity Project. Some of the more-frequently observed species included numerous native spring wildflowers, from pink lady's slippers (*Cypripedium acaule*) to Canada mayflowers (*Maianthemum canadense*), and colorful wildlife, from the iridescent green Six-spotted Tiger Beetle (*Cicindela sexguttata*) to the bright red Northern Cardinal (*Cardinalis cardinalis*). The July bioblitz had slightly less participation likely due to families taking summer vacations, yet we still achieved 550 observations of 327 species. Commonly-reported species from the July event ranged from the large Great Blue Heron (*Ardea herodias*) and eastern white pine (*Pinus strobus*) to the small Western Honey Bee (*Apis melifera*) and even smaller Oleander Aphid (*Aphis nerii*) - an orange-colored insect found on common milkweed (*Asclepias syriaca*) stems. Both events contributed significantly to the ecological inventories at each of the five focal properties and further expanded the knowledgebase of biodiversity within the Town of Windham.

Following the bioblitz events and the completion of our field work, we presented our findings to Windham Conservation Commission members and the Windham Garden Club on January 18, 2024. This presentation gave a brief overview of the project goals and methods, followed by highlighted species and other notable discoveries. Attendees were also invited to contribute to the Windham Biodiversity Project by sharing their observations of pollinators, wildflowers, and other organisms to the iNaturalist database.

Conclusion and Recommendations

Like many other towns in southern New Hampshire, Windham's natural resources are facing pressure from development, recreation, invasive plants and pests, and other forces. However, despite these challenges, each of the five town-owned properties we studied contained unique combinations of good-quality wildlife habitat and varied natural communities. In turn, these spaces provide critical habitat for several state-listed species and many others of conservation concern. Based on our findings, we recommend the following actions and considerations:

1. **Future development of trails** should highlight the site's rich natural history while avoiding sensitive ecological areas. Refer to Figures 24-28 for general guidance.

2. **Develop stewardship plans** for each property that involves additional detailed ecological inventories of all potentially-occurring species of greatest conservation need (e.g., bats,

fish, invertebrates, rare plants). Stewardship plans can provide specific guidance relative to the management of trails, development of educational signage, designation of ecological preserves, and/or timelines and treatments for land management activities. Property-specific actions may include:

a. Implementing a mowing regime at Campbell Farm that reduces threats to rare reptiles and promotes overall biodiversity.
b. Installing educational signage at Clyde Pond and Gage Lands to encourage bikers and hikers to limit their environmental impacts by staying on trails and carrying out trash.
c. Organizing one or more volunteer days at Foster's Pond to remove invasive species along the rail trail.
d. Identifying a community steward for the Ashton Woods property who can monitor for invasive species and remove them as detected. Furthermore, continue documenting observations of sensitive wildlife who may be using nearby properties.
e. Creating signage for an interpretive self-guided hike throughout Deer Leap that highlight's this property's unique geologic history, diverse flora, and important ecological features.

3. **Conduct radio-telemetry surveys** of rare reptile species on Town-owned lands to better understand their movement patterns and develop an effective, data-driven conservation plan to preserve these populations.

4. **Investigate mitigation and restoration opportunities**. These include upland and wetland efforts for invasive species management. High priority sites include Clyde Pond and the dense population of invasive *Phragmites*; the edge of the open managed area and rocky outcrops adjacent to Clyde Pond; and the eastern area of Foster's Pond. Other significant opportunities include restoring aquatic connectivity for sites associated with culverts and road crossings, including Foster's Pond and Clyde Pond. Additional mitigation efforts could focus on land acquisitions and/or landowner agreements to build upon the conservation values of current properties assessed for this project.

5. **Maintain and enhance habitat connectivity at additional sites throughout Windham**. This can be accomplished using the habitat connectivity map in Figure 23 in combination with field assessments to determine the type and specific location of enhancement.

6. **Identify future areas for conservation** using an integrated approach based on willing landowner cooperation and site-based ecological data. This can be achieved through the development of a *Natural Resources Inventory* and *Conservation Plan*.

7. **Conduct ecological inventories for other town-owned lands** to better understand their natural resources and biodiversity, as well as to inform stewardship plans and town-wide conservation planning.

8. **Continue community outreach and education** events aimed at generating more appreciation for Windham's town-owned natural areas and the important resources they protect. These can include organized hikes, bioblitz events, and workshops that highlight the significance of Windham's natural areas and how the community can help maintain their ecological integrity and recreational experiences.

9. **Clearly mark property boundaries**. Install new boundary markers, or check on existing marked boundaries, around each property to make sure each property line is clearly marked for abutting landowners. This will help reduce dumping and littering on Town-owned properties. Also consider conducting annual boundary monitoring to quickly detect issues and address them.

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Appendix I. Observed species by focal property.

Data sourced from iNaturalist, eBird, and Moosewood Ecological data. While most of the more than 2,500 community observations were vetted for accuracy, some species have been only tentatively identified. Many thousands of species exist in Windham, and this list only scratches the surface of all flora and fauna occurring at the properties of Ashton Woods (AW), Campbell Farm (CF), Clyde Pond and Gage Lands (CPGL), Deer Leap (DL), and Foster's Pond (FP).

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
	X				*Oligochaeta*	Earthworms and Allies	Animalia	Clitellata		
		X	X		*Aceria nyssae*	Black Tupelo Gall Mite	Arachnida	Arachnida	Sarcoptiformes	Eriophyidae
	X				*Eriophyes cerasicrumena*	Black Cherry Leaf Gall Mite	Arachnida	Arachnida	Sarcoptiformes	Eriophyidae
	X	X		X	*Eriophyes emarginatae*	Plum Finger Gall Mite	Arachnida	Arachnida	Sarcoptiformes	Eriophyidae
		X			*Vasates aceriscrumena*	Maple Spindle Gall Mite	Arachnida	Arachnida	Sarcoptiformes	Eriophyidae
				X	*Vasates quadripedes*	Maple Bladdergall Mite	Arachnida	Arachnida	Sarcoptiformes	Eriophyidae
		X			*Amblyomma maculatum*	Gulf Coast Tick	Arachnida	Arachnida	Ixodida	Ixodidae
		X			*Dermacentor variabilis*	American Dog Tick	Arachnida	Arachnida	Ixodida	Ixodidae
	X	X			*Ixodes scapularis*	Eastern Black-legged Tick	Arachnida	Arachnida	Ixodida	Ixodidae
				X	*Araneidae*	Orbweavers	Arachnida	Arachnida	Araneae	Araneidae
X		X	X	X	*Neriene radiata*	Filmy Dome Spider	Arachnida	Arachnida	Araneae	Linyphiidae
X		X			*Leucauge venusta*	Orchard Orbweaver	Arachnida	Arachnida	Araneae	Tetragnathidae
				X	*Herpyllus ecclesiasticus*	Eastern Parson Spider	Arachnida	Arachnida	Araneae	Gnaphosidae
		X			*Sergiolus*		Arachnida	Arachnida	Araneae	Gnaphosidae
		X			*Gladicosa gulosa*	Drumming Sword Wolf Spider	Arachnida	Arachnida	Araneae	Lycosidae
	X				*Pardosa*	Thin-legged Wolf Spiders	Arachnida	Arachnida	Araneae	Lycosidae
	X				*Piratula*		Arachnida	Arachnida	Araneae	Lycosidae
X	X	X		X	*Lycosidae*	Wolf Spiders	Arachnida	Arachnida	Araneae	Lycosidae
			X		*Pisaurina mira*	American Nursery Web Spider	Arachnida	Arachnida	Araneae	Pisauridae
		X			*Phlegra hentzi*		Arachnida	Arachnida	Araneae	Salticidae
	X				*Pelegrina*		Arachnida	Arachnida	Araneae	Salticidae
		X			*Phidippus audax*	Bold Jumping Spider	Arachnida	Arachnida	Araneae	Salticidae
		X			*Zygoballus rufipes*	Hammer-jawed Jumping Spider	Arachnida	Arachnida	Araneae	Salticidae
		X		X	*Maevia inclemens*	Dimorphic Jumping Spider	Arachnida	Arachnida	Araneae	Salticidae
		X			*Naphrys pulex*	flea jumping spider	Arachnida	Arachnida	Araneae	Salticidae
	X				*Habronattus*	Paradise Jumping Spiders	Arachnida	Arachnida	Araneae	Salticidae
	X				*Philodromus*	Running Crab Spiders	Arachnida	Arachnida	Araneae	Philodromidae
				X	*Xysticus*	Ground Crab Spiders	Arachnida	Arachnida	Araneae	Thomisidae
	X			X	*Thomisidae*	Crab Spiders	Arachnida	Arachnida	Araneae	Thomisidae
			X		*Callobius bennetti*	Bennett's Laceweaver	Arachnida	Arachnida	Araneae	Amaurobiidae
X					*Dictynidae*	Meshweavers	Arachnida	Arachnida	Araneae	Dictynidae
		X			*Sphodros niger*	Black Purseweb Spider	Arachnida	Arachnida	Araneae	Atypidae
		X		X	*Leiobunum*		Arachnida	Arachnida	Opiliones	Sclerosomatidae
		X	X	X	*Opiliones*	Harvestmen	Arachnida	Arachnida	Opiliones	
				X	*Faxonius virilis*	Virile Crayfish	Animalia	Malacostraca	Decapoda	Cambaridae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
				X	*Procambarus*		Animalia	Malacostraca	Decapoda	Cambaridae
		X			*Oniscus asellus*	Common Shiny Woodlouse	Animalia	Malacostraca	Isopoda	Oniscidae
			X		*Trachelipus rathkii*	Rathke's Woodlouse	Animalia	Malacostraca	Isopoda	Trachelipodidae
X			X		*Eubranchipus vernalis*	Springtime Fairy Shrimp	Animalia	Branchiopoda	Anostraca	Chirocephalidae
X	X	X	X		*Eubranchipus*		Animalia	Branchiopoda	Anostraca	Chirocephalidae
X		X	X	X	*Cicindela sexguttata*	Six-spotted Tiger Beetle	Insecta	Insecta	Coleoptera	Carabidae
X					*Poecilus lucublandus*	Woodland Ground Beetle	Insecta	Insecta	Coleoptera	Carabidae
X		X			*Pterostichina*		Insecta	Insecta	Coleoptera	Carabidae
X					*Acilius semisulcatus*	Woods Predaceous Diving Beetle	Insecta	Insecta	Coleoptera	Dytiscidae
X	X				*Acilius*	Small Flat Diving Beetles	Insecta	Insecta	Coleoptera	Dytiscidae
	X				*Hydroporinae*		Insecta	Insecta	Coleoptera	Dytiscidae
		X			*Dineutus*		Insecta	Insecta	Coleoptera	Gyrinidae
	X				*Brachys aerosus*	Northern Red Oak Jewel Beetle	Insecta	Insecta	Coleoptera	Buprestidae
		X			*Buprestis striata*	Striated Jewel Beetle	Insecta	Insecta	Coleoptera	Buprestidae
		X			*Urgleptes querci*	Oak Long-horned Beetle	Insecta	Insecta	Coleoptera	Cerambycidae
	X	X			*Tetraopes tetrophthalmus*	Red Milkweed Beetle	Insecta	Insecta	Coleoptera	Cerambycidae
				X	*Analeptura lineola*		Insecta	Insecta	Coleoptera	Cerambycidae
				X	*Strangalepta abbreviata*	Strangalepta Flower Longhorn Beetle	Insecta	Insecta	Coleoptera	Cerambycidae
		X			*Strangalia luteicornis*	Yellow-horned Flower Longhorn Beetle	Insecta	Insecta	Coleoptera	Cerambycidae
		X			*Typocerus velutinus*	Banded Longhorn Beetle	Insecta	Insecta	Coleoptera	Cerambycidae
	X				*Chalepus walshii*		Insecta	Insecta	Coleoptera	Chrysomelidae
		X			*Microrhopala excavata*		Insecta	Insecta	Coleoptera	Chrysomelidae
		X			*Microrhopala vittata*	Goldenrod Leaf Miner Beetle	Insecta	Insecta	Coleoptera	Chrysomelidae
		X			*Labidomera clivicollis*	Swamp Milkweed Leaf Beetle	Insecta	Insecta	Coleoptera	Chrysomelidae
X					*Lilioceris lilii*	Lily Leaf Beetle	Insecta	Insecta	Coleoptera	Chrysomelidae
	X				*Chrysochus auratus*	Dogbane Leaf Beetle	Insecta	Insecta	Coleoptera	Chrysomelidae
		X			*Dibolia borealis*	Northern Plantain Flea Beetle	Insecta	Insecta	Coleoptera	Chrysomelidae
	X				*Galerucella pusilla*	Golden Loosestrife Beetle	Insecta	Insecta	Coleoptera	Chrysomelidae
		X			*Chariessa pilosa*	Pilose Checkered Beetle	Insecta	Insecta	Coleoptera	Cleridae
	X				*Coccinella septempunctata*	Seven-spotted Lady Beetle	Insecta	Insecta	Coleoptera	Coccinellidae
		X			*Harmonia axyridis*	Asian Lady Beetle	Insecta	Insecta	Coleoptera	Coccinellidae
	X	X			*Propylea quatuordecimpunctata*	Fourteen-spotted Lady Beetle	Insecta	Insecta	Coleoptera	Coccinellidae
	X				*Polydrusus formosus*	Green Immigrant Leaf Weevil	Insecta	Insecta	Coleoptera	Curculionidae
		X			*Larinus obtusus*	Blunt Knapweed Flower Weevil	Insecta	Insecta	Coleoptera	Curculionidae
	X				*Atalantycha bilineata*	Two-lined Leatherwing	Insecta	Insecta	Coleoptera	Cantharidae
	X		X		*Atalantycha*		Insecta	Insecta	Coleoptera	Cantharidae
	X				*Cantharis livida*		Insecta	Insecta	Coleoptera	Cantharidae
	X				*Cantharis rufa*	Red Soldier Beetle	Insecta	Insecta	Coleoptera	Cantharidae
X					*Rhagonycha*		Insecta	Insecta	Coleoptera	Cantharidae
X	X	X	X		*Cantharini*		Insecta	Insecta	Coleoptera	Cantharidae
X					*Podabrus rugosulus*	Wrinkled Soldier Beetle	Insecta	Insecta	Coleoptera	Cantharidae
		X			*Chauliognathus pensylvanicus*	Goldenrod Soldier Beetle	Insecta	Insecta	Coleoptera	Cantharidae
	X				*Gambrinus*		Insecta	Insecta	Coleoptera	Elateridae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
	X				*Limonius aurifer*	Gold-headed Click Beetle	Insecta	Insecta	Coleoptera	Elateridae
		X	X		*Limonius basilaris*	Basal Click Beetle	Insecta	Insecta	Coleoptera	Elateridae
X	X	X	X		*Limonius*		Insecta	Insecta	Coleoptera	Elateridae
	X				*Stropenron hieroglyphica*		Insecta	Insecta	Coleoptera	Elateridae
		X			*Dolerosomus silaceus*		Insecta	Insecta	Coleoptera	Elateridae
	X				*Lucidota atra*	Black Firefly	Insecta	Insecta	Coleoptera	Lampyridae
	X				*Ellychnia corrusca*	Winter Firefly	Insecta	Insecta	Coleoptera	Lampyridae
	X				*Photinus*		Insecta	Insecta	Coleoptera	Lampyridae
X					*Lycidae*	Net-winged Beetles	Insecta	Insecta	Coleoptera	Lycidae
		X			*Tropisternus*		Insecta	Insecta	Coleoptera	Hydrophilidae
			X		*Melolonthinae*	June Beetles	Insecta	Insecta	Coleoptera	Scarabaeidae
X					*Popillia japonica*	Japanese Beetle	Insecta	Insecta	Coleoptera	Scarabaeidae
X				X	*Exomala orientalis*	Oriental Beetle	Insecta	Insecta	Coleoptera	Scarabaeidae
				X	*Nyholmia collaris*		Insecta	Insecta	Coleoptera	Scirtidae
	X				*Ocypus nitens*		Insecta	Insecta	Coleoptera	Staphylinidae
		X			*Pedilus elegans*		Insecta	Insecta	Coleoptera	Pyrochroidae
	X				*Capnochroa fuliginosa*	Comb-clawed Beetle	Insecta	Insecta	Coleoptera	Tenebrionidae
		X			*Efferia aestuans*	Northeastern Hammertail	Insecta	Insecta	Diptera	Asilidae
	X				*Dioctria hyalipennis*	Stripe-legged Robber Fly	Insecta	Insecta	Diptera	Asilidae
			X	X	*Laphria canis*		Insecta	Insecta	Diptera	Asilidae
X					*Ozodiceromyia*		Insecta	Insecta	Diptera	Therevidae
		X			*Dolichopus*		Insecta	Insecta	Diptera	Dolichopodidae
	X				*Condylostylus patibulatus*		Insecta	Insecta	Diptera	Dolichopodidae
	X	X			*Condylostylus caudatus*		Insecta	Insecta	Diptera	Dolichopodidae
	X				*Minettia*		Insecta	Insecta	Diptera	Lauxaniidae
				X	*Chirosia filicis*		Insecta	Insecta	Diptera	Anthomyiidae
		X			*Leucophora*		Insecta	Insecta	Diptera	Anthomyiidae
	X	X		X	*Anthomyiidae*	Root-maggot Flies	Insecta	Insecta	Diptera	Anthomyiidae
	X		X		*Scathophaga*		Insecta	Insecta	Diptera	Scathophagidae
X	X	X	X	X	*Muscoidea*	Muscoid Flies	Insecta	Insecta	Diptera	
	X				*Pollenia*	Cluster Flies	Insecta	Insecta	Diptera	Polleniidae
		X	X		*Sarcophaga*	Common Flesh Flies	Insecta	Insecta	Diptera	Sarcophagidae
X					*Istocheta aldrichi*	Winsome Fly	Insecta	Insecta	Diptera	Tachinidae
				X	*Leschenaultia*		Insecta	Insecta	Diptera	Tachinidae
X	X				*Epalpus signifer*	Early Tachinid Fly	Insecta	Insecta	Diptera	Tachinidae
				X	*Tachinidae*	Tachinid Flies	Insecta	Insecta	Diptera	Tachinidae
		X			*Agromyza idaeiana*		Insecta	Insecta	Diptera	Agromyzidae
	X			X	*Agromyza vockerothi*		Insecta	Insecta	Diptera	Agromyzidae
				X	*Calycomyza*		Insecta	Insecta	Diptera	Agromyzidae
		X			*Liriomyza fricki*		Insecta	Insecta	Diptera	Agromyzidae
X				X	*Liriomyza smilacinae*		Insecta	Insecta	Diptera	Agromyzidae
X				X	*Phytoliriomyza melampyga*	Jewelweed Leaf-miner Fly	Insecta	Insecta	Diptera	Agromyzidae
X				X	*Phytomyza aralivora*		Insecta	Insecta	Diptera	Agromyzidae
X					*Tetanocera*		Insecta	Insecta	Diptera	Sciomyzidae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
	X				*Euxesta*	Cornsilk Flies	Insecta	Insecta	Diptera	Ulidiidae
	X				*Rhagio tringarius*	Marsh Snipe Fly	Insecta	Insecta	Diptera	Rhagionidae
	X				*Eristalis dimidiata*	Black-shouldered Drone Fly	Insecta	Insecta	Diptera	Syrphidae
	X			X	*Helophilus fasciatus*	Narrow-headed Marsh Fly	Insecta	Insecta	Diptera	Syrphidae
		X			*Spilomyia longicornis*	Eastern Hornet Fly	Insecta	Insecta	Diptera	Syrphidae
				X	*Brachypalpus oarus*	Eastern Catkin Fly	Insecta	Insecta	Diptera	Syrphidae
	X				*Melanostoma mellinum*	Variable Duskyface Fly	Insecta	Insecta	Diptera	Syrphidae
	X				*Sphaerophoria*	Globetails	Insecta	Insecta	Diptera	Syrphidae
X					*Toxomerus geminatus*	Eastern Calligrapher	Insecta	Insecta	Diptera	Syrphidae
			X		*Mochlonyx*		Insecta	Insecta	Diptera	Chaoboridae
X					*Ochlerotatus*		Insecta	Insecta	Diptera	Culicidae
				X	*Macrodiplosis niveipila*		Insecta	Insecta	Diptera	Cecidomyiidae
			X	X	*Macrodiplosis*		Insecta	Insecta	Diptera	Cecidomyiidae
				X	*Blaesodiplosis venae*		Insecta	Insecta	Diptera	Cecidomyiidae
	X	X		X	*Acericecis ocellaris*	Ocellate Gall Midge	Insecta	Insecta	Diptera	Cecidomyiidae
		X			*Gliaspilota glutinosa*		Insecta	Insecta	Diptera	Cecidomyiidae
X					*Epiphragma fasciapenne*	Band-winged Crane Fly	Insecta	Insecta	Diptera	Limoniidae
X				X	*Limoniidae*	Limoniid Crane Flies	Insecta	Insecta	Diptera	Limoniidae
		X			*Tipula abdominalis*	Giant Crane Fly	Insecta	Insecta	Diptera	Tipulidae
		X			*Pterelachisus*		Insecta	Insecta	Diptera	Tipulidae
	X			X	*Bibio albipennis*	White-winged March Fly	Insecta	Insecta	Diptera	Bibionidae
				X	*Ephemeroptera*	Mayflies	Insecta	Insecta	Ephemeroptera	
		X			*Philaenus spumarius*	Meadow Spittlebug	Insecta	Insecta	Hemiptera	Aphrophoridae
X				X	*Synecdoche impunctata*		Insecta	Insecta	Hemiptera	Achilidae
X		X			*Graphocephala fennahi*	Rhododendron Leafhopper	Insecta	Insecta	Hemiptera	Cicadellidae
				X	*Helochara communis*	Bog Leafhopper	Insecta	Insecta	Hemiptera	Cicadellidae
	X				*Errastunus ocellaris*		Insecta	Insecta	Hemiptera	Cicadellidae
		X			*Entylia carinata*	Keeled Treehopper	Insecta	Insecta	Hemiptera	Membracidae
	X				*Cyrtolobus*		Insecta	Insecta	Hemiptera	Membracidae
		X			*Alydus eurinus*	Eastwind Broad-headed Bug	Insecta	Insecta	Hemiptera	Alydidae
X					*Acanthocephala terminalis*		Insecta	Insecta	Hemiptera	Coreidae
		X			*Corixini*		Insecta	Insecta	Hemiptera	Corixidae
				X	*Aquarius remigis*	North American Common Water Strider	Insecta	Insecta	Hemiptera	Gerridae
X	X	X			*Gerris*		Insecta	Insecta	Hemiptera	Gerridae
		X			*Neoneides muticus*		Insecta	Insecta	Hemiptera	Berytidae
X					*Jalysus*		Insecta	Insecta	Hemiptera	Berytidae
	X				*Geocoris uliginosus*		Insecta	Insecta	Hemiptera	Geocoridae
		X			*Oedancala dorsalis*		Insecta	Insecta	Hemiptera	Pachygronthidae
	X				*Leptopterna dolabrata*	Meadow Plant Bug	Insecta	Insecta	Hemiptera	Miridae
		X			*Notonecta*	Milky Backswimmers	Insecta	Insecta	Hemiptera	Notonectidae
	X				*Pangaeus bilineatus*	Two-lined Burrowing Bug	Insecta	Insecta	Hemiptera	Cydnidae
	X				*Coenus delius*		Insecta	Insecta	Hemiptera	Pentatomidae
		X			*Mormidea lugens*		Insecta	Insecta	Hemiptera	Pentatomidae
				X	*Chinavia hilaris*	Green Stink Bug	Insecta	Insecta	Hemiptera	Pentatomidae

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		X			*Pselliopus cinctus*	Ringed Assassin Bug	Insecta	Insecta	Hemiptera	Reduviidae
	X				*Zelus luridus*	Pale Green Assassin Bug	Insecta	Insecta	Hemiptera	Reduviidae
		X			*Aphis nerii*	Oleander Aphid	Insecta	Insecta	Hemiptera	Aphididae
		X			*Aphis spiraecola*	Spiraea Aphid	Insecta	Insecta	Hemiptera	Aphididae
X		X	X	X	*Hormaphis hamamelidis*	Witch-hazel Cone Gall Aphid	Insecta	Insecta	Hemiptera	Aphididae
		X		X	*Adelges tsugae*	Hemlock Woolly Adelgid	Insecta	Insecta	Hemiptera	Adelgidae
		X		X	*Pineus strobi*	Pine Bark Adelgid	Insecta	Insecta	Hemiptera	Adelgidae
	X		X		*Phylloxera caryaesemen*		Insecta	Insecta	Hemiptera	Phylloxeridae
			X		*Phylloxera*	Phylloxeras	Insecta	Insecta	Hemiptera	Phylloxeridae
	X				*Andrena alleghaniensis*	Allegheny Mining Bee	Insecta	Insecta	Hymenoptera	Andrenidae
			X		*Andrena vicina*	Neighborly Mining Bee	Insecta	Insecta	Hymenoptera	Andrenidae
	X	X	X	X	*Andrena*	Mining Bees	Insecta	Insecta	Hymenoptera	Andrenidae
	X				*Melandrena*		Insecta	Insecta	Hymenoptera	Andrenidae
X	X	X			*Apis mellifera*	Western Honey Bee	Insecta	Insecta	Hymenoptera	Apidae
	X			X	*Bombus bimaculatus*	Two-spotted Bumble Bee	Insecta	Insecta	Hymenoptera	Apidae
	X			X	*Bombus impatiens*	Common Eastern Bumble Bee	Insecta	Insecta	Hymenoptera	Apidae
	X	X		X	*Pyrobombus*		Insecta	Insecta	Hymenoptera	Apidae
	X	X		X	*Bombus*	Bumble Bees	Insecta	Insecta	Hymenoptera	Apidae
	X	X	X	X	*Nomada*	Nomad Bees	Insecta	Insecta	Hymenoptera	Apidae
		X			*Zadontomerus*		Insecta	Insecta	Hymenoptera	Apidae
	X				*Xylocopa virginica*	Eastern Carpenter Bee	Insecta	Insecta	Hymenoptera	Apidae
X					*Crabronidae*	Square-headed Wasps, Sand Wasps, and Allies	Insecta	Insecta	Hymenoptera	Crabronidae
X					*Augochlora pura*	Pure Green Sweat bee	Insecta	Insecta	Hymenoptera	Halictidae
X	X				*Augochlorella*		Insecta	Insecta	Hymenoptera	Halictidae
		X			*Augochloropsis viridula*		Insecta	Insecta	Hymenoptera	Halictidae
		X			*Agapostemon virescens*	Bicolored Striped Sweat Bee	Insecta	Insecta	Hymenoptera	Halictidae
	X	X			*Agapostemon*		Insecta	Insecta	Hymenoptera	Halictidae
		X			*Halictus ligatus*	Ligated Furrow Bee	Insecta	Insecta	Hymenoptera	Halictidae
	X	X			*Halictus*	Furrow Bees	Insecta	Insecta	Hymenoptera	Halictidae
		X			*Lasioglossum*		Insecta	Insecta	Hymenoptera	Halictidae
		X			*Anthidium oblongatum*	Oblong Woolcarder Bee	Insecta	Insecta	Hymenoptera	Megachilidae
				X	*Osmia*		Insecta	Insecta	Hymenoptera	Megachilidae
		X			*Isodontia mexicana*	Mexican Grass-carrying Wasp	Insecta	Insecta	Hymenoptera	Sphecidae
X					*Hemadas nubilipennis*	Blueberry Stem Gall Wasp	Insecta	Insecta	Hymenoptera	Ormyridae
	X				*Chrysidini*		Insecta	Insecta	Hymenoptera	Chrysididae
		X			*Hedychrum*		Insecta	Insecta	Hymenoptera	Chrysididae
				X	*Amphibolips confluenta*	Spongy Oak Apple Gall Wasp	Insecta	Insecta	Hymenoptera	Cynipidae
			X		*Amphibolips quercusinanis*	Larger Empty Oak Apple Wasp	Insecta	Insecta	Hymenoptera	Cynipidae
X			X	X	*Amphibolips*		Insecta	Insecta	Hymenoptera	Cynipidae
			X		*Callirhytis lanata*	Woolly Oak Gall Wasp	Insecta	Insecta	Hymenoptera	Cynipidae
	X			X	*Callirhytis quercusfutilis*	Oak Wart Gall Wasp	Insecta	Insecta	Hymenoptera	Cynipidae
			X		*Callirhytis quercusoperator*	Woolly Catkin Gall Wasp	Insecta	Insecta	Hymenoptera	Cynipidae
				X	*Callirhytis seminator*	Wool Sower Gall Wasp	Insecta	Insecta	Hymenoptera	Cynipidae

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				X	*Disholcaspis quercusglobulus*	Round Bullet Gall Wasp	Insecta	Insecta	Hymenoptera	Cynipidae
		X			*Camponotus pennsylvanicus*	Eastern Black Carpenter Ant	Insecta	Insecta	Hymenoptera	Formicidae
X		X			*Myrmentoma*		Insecta	Insecta	Hymenoptera	Formicidae
		X			*Formica fusca*	fusca-group Field Ants and Allies	Insecta	Insecta	Hymenoptera	Formicidae
		X			*Cautolasius*		Insecta	Insecta	Hymenoptera	Formicidae
		X			*Aphaenogaster fulva*	fulva-rudis-texana-complex Collared Ants	Insecta	Insecta	Hymenoptera	Formicidae
	X				*Therion circumflexum*		Insecta	Insecta	Hymenoptera	Ichneumonidae
	X				*Ichneumonina*		Insecta	Insecta	Hymenoptera	Ichneumonidae
	X				*Ophion*		Insecta	Insecta	Hymenoptera	Ichneumonidae
				X	*Priocnemis minorata*		Insecta	Insecta	Hymenoptera	Pompilidae
X	X				*Polistes fuscatus*	Northern Paper Wasp	Insecta	Insecta	Hymenoptera	Vespidae
X	X				*Acordulecera*		Insecta	Insecta	Hymenoptera	Pergidae
	X				*Macremphytus*	Dogwood Sawflies	Insecta	Insecta	Hymenoptera	Tenthredinidae
	X				*Metallus rohweri*		Insecta	Insecta	Hymenoptera	Tenthredinidae
X	X				*Tenthredininae*		Insecta	Insecta	Hymenoptera	Tenthredinidae
X	X		X		*Tenthredinoidea*	Typical Sawflies	Insecta	Insecta	Hymenoptera	
		X			*Hemaris diffinis*	Snowberry Clearwing	Insecta	Insecta	Lepidoptera	Sphingidae
			X		*Choreutidae*	Metalmark Moths	Insecta	Insecta	Lepidoptera	Choreutidae
		X			*Coleophora*	Casebearers	Insecta	Insecta	Lepidoptera	Coleophoridae
		X			*Dichomeris punctidiscellus*	Spotted Dichomeris Moth	Insecta	Insecta	Lepidoptera	Gelechiidae
		X			*Plagodis alcoolaria*	Hollow-spotted Plagodis Moth	Insecta	Insecta	Lepidoptera	Geometridae
	X			X	*Eufidonia notataria*	Powder Moth	Insecta	Insecta	Lepidoptera	Geometridae
	X			X	*Cabera erythemaria*	Yellow-dusted Cream Moth	Insecta	Insecta	Lepidoptera	Geometridae
	X		X		*Campaea perlata*	Pale Beauty	Insecta	Insecta	Lepidoptera	Geometridae
X					*Besma endropiaria*	Straw Besma Moth	Insecta	Insecta	Lepidoptera	Geometridae
		X			*Macaria bisignata*	Red-headed Inchworm Moth	Insecta	Insecta	Lepidoptera	Geometridae
		X	X		*Macaria*		Insecta	Insecta	Lepidoptera	Geometridae
	X				*Cladara limitaria*	Mottled Gray Carpet	Insecta	Insecta	Lepidoptera	Geometridae
	X				*Xanthorhoe lacustrata*	Toothed Brown Carpet	Insecta	Insecta	Lepidoptera	Geometridae
X					*Cyclophora pendulinaria*	Sweetfern Geometer Moth	Insecta	Insecta	Lepidoptera	Geometridae
X					*Scopula limboundata*	Large Lace-border Moth	Insecta	Insecta	Lepidoptera	Geometridae
				X	*Cameraria corylisella*	Hazel Blotchminer	Insecta	Insecta	Lepidoptera	Gracillariidae
X		X			*Cameraria guttifinitella*	Poison Ivy Leaf-miner Moth	Insecta	Insecta	Lepidoptera	Gracillariidae
X					*Cameraria hamameliella*	Witchhazel Leafminer	Insecta	Insecta	Lepidoptera	Gracillariidae
				X	*Malacosoma americana*	Eastern Tent Caterpillar Moth	Insecta	Insecta	Lepidoptera	Lasiocampidae
				X	*Ectoedemia populella*	Aspen Petiole Gall Moth	Insecta	Insecta	Lepidoptera	Nepticulidae
X					*Stigmella prunifoliella*		Insecta	Insecta	Lepidoptera	Nepticulidae
				X	*Stigmella quercipulchella*		Insecta	Insecta	Lepidoptera	Nepticulidae
	X				*Stigmella rhamnicola*		Insecta	Insecta	Lepidoptera	Nepticulidae
	X				*Haploa*		Insecta	Insecta	Lepidoptera	Erebidae
				X	*Lophocampa caryae*	Hickory Tussock Moth	Insecta	Insecta	Lepidoptera	Erebidae
X				X	*Virbia*	Virbia Moths	Insecta	Insecta	Lepidoptera	Erebidae
			X		*Zale aeruginosa*	Green-dusted Zale Moth	Insecta	Insecta	Lepidoptera	Erebidae

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	X	X		X	*Chytolita morbidalis*	Morbid Owlet	Insecta	Insecta	Lepidoptera	Erebidae
	X				*Idia aemula*	Common Idia Moth	Insecta	Insecta	Lepidoptera	Erebidae
X					*Idia rotundalis*	Rotund Idia Moth	Insecta	Insecta	Lepidoptera	Erebidae
X				X	*Renia discoloralis*	Discolored Renia Moth	Insecta	Insecta	Lepidoptera	Erebidae
X		X			*Renia flavipunctalis*	Yellow-spotted Renia Moth	Insecta	Insecta	Lepidoptera	Erebidae
X					*Renia salusalis*	Dotted Renia Moth	Insecta	Insecta	Lepidoptera	Erebidae
				X	*Herminiinae*	Litter Moths	Insecta	Insecta	Lepidoptera	Erebidae
X					*Hypenodinae*		Insecta	Insecta	Lepidoptera	Erebidae
				X	*Noctuidae*	Cutworm Moths and Allies	Insecta	Insecta	Lepidoptera	Noctuidae
				X	*Cecrita guttivitta*	Saddled Prominent	Insecta	Insecta	Lepidoptera	Notodontidae
		X			*Euphyes vestris*	Dun Skipper	Insecta	Insecta	Lepidoptera	Hesperiidae
		X			*Poanes viator*	Broad-winged Skipper	Insecta	Insecta	Lepidoptera	Hesperiidae
		X			*Polites egeremet*	Northern Broken-Dash	Insecta	Insecta	Lepidoptera	Hesperiidae
	X	X			*Polites mystic*	Long Dash	Insecta	Insecta	Lepidoptera	Hesperiidae
	X				*Polites peckius*	Peck's Skipper	Insecta	Insecta	Lepidoptera	Hesperiidae
	X	X			*Lycaena hypophlaeas*	American Copper	Insecta	Insecta	Lepidoptera	Lycaenidae
	X				*Celastrina*	Holarctic Azures	Insecta	Insecta	Lepidoptera	Lycaenidae
	X	X		X	*Callophrys niphon*	Eastern Pine Elfin	Insecta	Insecta	Lepidoptera	Lycaenidae
	X				*Danaus plexippus*	Monarch	Insecta	Insecta	Lepidoptera	Nymphalidae
		X			*Limenitis archippus*	Viceroy	Insecta	Insecta	Lepidoptera	Nymphalidae
		X			*Limenitis arthemis astyanax*	Red-spotted Purple	Insecta	Insecta	Lepidoptera	Nymphalidae
		X			*Limenitis arthemis*	Red-spotted Admiral	Insecta	Insecta	Lepidoptera	Nymphalidae
	X	X			*Limenitis*		Insecta	Insecta	Lepidoptera	Nymphalidae
		X			*Phyciodes cocyta*	Northern Crescent	Insecta	Insecta	Lepidoptera	Nymphalidae
	X	X			*Phyciodes*	Crescents	Insecta	Insecta	Lepidoptera	Nymphalidae
X	X			X	*Nymphalis antiopa*	Mourning Cloak	Insecta	Insecta	Lepidoptera	Nymphalidae
				X	*Polygonia comma*	Eastern Comma	Insecta	Insecta	Lepidoptera	Nymphalidae
	X				*Coenonympha california*	Common Ringlet	Insecta	Insecta	Lepidoptera	Nymphalidae
X					*Lethe appalachia*	Appalachian Brown	Insecta	Insecta	Lepidoptera	Nymphalidae
		X			*Papilio troilus*	Spicebush Swallowtail	Insecta	Insecta	Lepidoptera	Papilionidae
X	X			X	*Pterourus*	Tiger Swallowtails and Allies	Insecta	Insecta	Lepidoptera	Papilionidae
	X				*Colias eurytheme*	Orange Sulphur	Insecta	Insecta	Lepidoptera	Pieridae
	X				*Colias philodice*	Clouded Sulphur	Insecta	Insecta	Lepidoptera	Pieridae
X		X			*Pieris rapae*	Cabbage White	Insecta	Insecta	Lepidoptera	Pieridae
	X				*Crambus laqueatellus*	Eastern Grass-veneer	Insecta	Insecta	Lepidoptera	Crambidae
X	X				*Crambus*		Insecta	Insecta	Lepidoptera	Crambidae
		X			*Blepharomastix ranalis*	Hollow-spotted Blepharomastix Moth	Insecta	Insecta	Lepidoptera	Crambidae
X		X			*Blepharomastix*		Insecta	Insecta	Lepidoptera	Crambidae
		X		X	*Diacme adipaloides*	Darker Diacme Moth	Insecta	Insecta	Lepidoptera	Crambidae
	X				*Apogeshna stenialis*	Checkered Apogeshna Moth	Insecta	Insecta	Lepidoptera	Crambidae
X	X	X	X	X	*Pyraloidea*	Pyralid and Crambid Snout Moths	Insecta	Insecta	Lepidoptera	
	X	X			*Psyche casta*	Common Bagworm Moth	Insecta	Insecta	Lepidoptera	Psychidae
		X			*Pelochrista argentialbana*		Insecta	Insecta	Lepidoptera	Tortricidae
X					*Olethreutes hamameliana*	Witch-hazel Olethreutes	Insecta	Insecta	Lepidoptera	Tortricidae

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X					*Olethreutes*	Olethreutes Moths	Insecta	Insecta	Lepidoptera	Tortricidae
X	X	X			*Olethreutini*		Insecta	Insecta	Lepidoptera	Tortricidae
	X				*Clepsis melaleucanus*	Black-patched Clepsis Moth	Insecta	Insecta	Lepidoptera	Tortricidae
			X		*Pandemis limitata*	Three-lined Leafroller Moth	Insecta	Insecta	Lepidoptera	Tortricidae
	X	X			*Chrysopa oculata*	Golden-eyed lacewing	Insecta	Insecta	Neuroptera	Chrysopidae
X					*Anax junius*	Common Green Darner	Insecta	Insecta	Odonata	Aeshnidae
		X			*Cordulegaster*	Spiketails	Insecta	Insecta	Odonata	Cordulegastridae
	X				*Phanogomphus exilis*	Lancet Clubtail	Insecta	Insecta	Odonata	Gomphidae
	X	X			*Phanogomphus*	Phanogomphus Clubtails	Insecta	Insecta	Odonata	Gomphidae
		X		X	*Epitheca canis*	Beaverpond Baskettail	Insecta	Insecta	Odonata	Corduliidae
		X			*Erythemis simplicicollis*	Eastern Pondhawk	Insecta	Insecta	Odonata	Libellulidae
		X			*Ladona julia*	Chalk-fronted Corporal	Insecta	Insecta	Odonata	Libellulidae
	X	X			*Leucorrhinia intacta*	Dot-tailed Whiteface	Insecta	Insecta	Odonata	Libellulidae
	X				*Libellula cyanea*	Spangled Skimmer	Insecta	Insecta	Odonata	Libellulidae
	X	X		X	*Libellula incesta*	Slaty Skimmer	Insecta	Insecta	Odonata	Libellulidae
	X	X			*Libellula luctuosa*	Widow Skimmer	Insecta	Insecta	Odonata	Libellulidae
X		X		X	*Pachydiplax longipennis*	Blue Dasher	Insecta	Insecta	Odonata	Libellulidae
		X			*Perithemis tenera*	Eastern Amberwing	Insecta	Insecta	Odonata	Libellulidae
	X	X		X	*Plathemis lydia*	Common Whitetail	Insecta	Insecta	Odonata	Libellulidae
		X			*Sympetrum vicinum*	Autumn Meadowhawk	Insecta	Insecta	Odonata	Libellulidae
X	X	X		X	*Sympetrum*	Meadowhawks	Insecta	Insecta	Odonata	Libellulidae
	X			X	*Calopteryx maculata*	Ebony Jewelwing	Insecta	Insecta	Odonata	Calopterygidae
	X			X	*Argia fumipennis*	Variable Dancer	Insecta	Insecta	Odonata	Coenagrionidae
	X				*Chromagrion conditum*	Aurora Damsel	Insecta	Insecta	Odonata	Coenagrionidae
	X	X			*Enallagma divagans*	Turquoise Bluet	Insecta	Insecta	Odonata	Coenagrionidae
X	X	X			*Ischnura posita*	Fragile Forktail	Insecta	Insecta	Odonata	Coenagrionidae
X		X			*Ischnura verticalis*	Eastern Forktail	Insecta	Insecta	Odonata	Coenagrionidae
X	X				*Lestes rectangularis*	Slender Spreadwing	Insecta	Insecta	Odonata	Lestidae
X	X	X		X	*Lestes*	Pond Spreadwings	Insecta	Insecta	Odonata	Lestidae
		X			*Melanoplus bivittatus*	Two-striped Grasshopper	Insecta	Insecta	Orthoptera	Acrididae
		X			*Melanoplus femurrubrum*	Red-legged Grasshopper	Insecta	Insecta	Orthoptera	Acrididae
	X				*Chortophaga viridifasciata*	Green-striped Grasshopper	Insecta	Insecta	Orthoptera	Acrididae
		X			*Dissosteira carolina*	Carolina Grasshopper	Insecta	Insecta	Orthoptera	Acrididae
				X	*Tettigidea lateralis*	Black-sided Pygmy Grasshopper	Insecta	Insecta	Orthoptera	Tetrigidae
	X	X		X	*Tetrix*		Insecta	Insecta	Orthoptera	Tetrigidae
				X	*Nemobiinae*	Ground Crickets	Insecta	Insecta	Orthoptera	Trigonidiidae
X					*Conocephalus*	Lesser Meadow Katydids	Insecta	Insecta	Orthoptera	Tettigoniidae
		X			*Isoperla*		Insecta	Insecta	Plecoptera	Perlodidae
		X			*Perlodidae*	Stripetail and Springfly Stoneflies	Insecta	Insecta	Plecoptera	Perlodidae
	X				*Phryganeidae*	Giant Casemaker Caddisflies	Insecta	Insecta	Trichoptera	Phryganeidae
		X			*Trichoptera*	Caddisflies	Insecta	Insecta	Trichoptera	
X		X			*Ophyiulus*		Animalia	Diplopoda	Julida	Julidae
X	X	X			*Juliformia*	Round-backed Millipedes	Animalia	Diplopoda		
				X	*Polydesmida*	Flat-backed Millipedes	Animalia	Diplopoda	Polydesmida	

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	X				*Notemigonus crysoleucas*	Golden Shiner	Actinopterygii	Actinopterygii	Cypriniformes	Leuciscidae
			X		*Lepomis*	Common Sunfishes	Actinopterygii	Actinopterygii	Centrarchiformes	Centrarchidae
				X	*Esox niger*	Chain Pickerel	Actinopterygii	Actinopterygii	Salmoniformes	Esocidae
			X	X	*Anaxyrus americanus*	American Toad	Amphibia	Amphibia	Anura	Bufonidae
X		X	X	X	*Hyla versicolor*	Gray Treefrog	Amphibia	Amphibia	Anura	Hylidae
X		X		X	*Pseudacris crucifer*	Spring Peeper	Amphibia	Amphibia	Anura	Hylidae
X				X	*Lithobates catesbeianus*	American Bullfrog	Amphibia	Amphibia	Anura	Ranidae
X		X		X	*Lithobates clamitans*	Green Frog	Amphibia	Amphibia	Anura	Ranidae
X		X		X	*Lithobates palustris*	Pickerel Frog	Amphibia	Amphibia	Anura	Ranidae
X	X	X		X	*Lithobates sylvaticus*	Wood Frog	Amphibia	Amphibia	Anura	Ranidae
X		X			*Ambystoma maculatum*	Spotted Salamander	Amphibia	Amphibia	Caudata	Ambystomatidae
		X			*Eurycea bislineata*	Northern Two-lined Salamander	Amphibia	Amphibia	Caudata	Plethodontidae
X		X		X	*Plethodon cinereus*	Eastern Red-backed Salamander	Amphibia	Amphibia	Caudata	Plethodontidae
					Accipiter cooperii	Cooper's Hawk	Aves	Aves	Accipitriformes	Accipitridae
	X	X			*Buteo jamaicensis*	Red-tailed Hawk	Aves	Aves	Accipitriformes	Accipitridae
X	X			X	*Buteo lineatus*	Red-shouldered Hawk	Aves	Aves	Accipitriformes	Accipitridae
		X	X	X	*Buteo platypterus*	Broad-winged Hawk	Aves	Aves	Accipitriformes	Accipitridae
X					*Haliaeetus leucocephalus*	Bald Eagle	Aves	Aves	Accipitriformes	Accipitridae
		X			*Pandion haliaetus*	Osprey	Aves	Aves	Accipitriformes	Pandionidae
X	X	X	X	X	*Aix sponsa*	Wood Duck	Aves	Aves	Anseriformes	Anatidae
X	X		X	X	*Anas platyrhynchos*	Mallard	Aves	Aves	Anseriformes	Anatidae
				X	*Anas rubripes*	American Black Duck	Aves	Aves	Anseriformes	Anatidae
			X	X	*Aythya collaris*	Ring-necked Duck	Aves	Aves	Anseriformes	Anatidae
X	X		X	X	*Branta canadensis*	Canada Goose	Aves	Aves	Anseriformes	Anatidae
			X	X	*Bucephala albeola*	Bufflehead	Aves	Aves	Anseriformes	Anatidae
			X	X	*Lophodytes cucullatus*	Hooded Merganser	Aves	Aves	Anseriformes	Anatidae
			X		*Mergus merganser*	Common Merganser	Aves	Aves	Anseriformes	Anatidae
X					*Spatula discors*	Blue-winged Teal	Aves	Aves	Anseriformes	Anatidae
	X		X	X	*Chaetura pelagica*	Chimney Swift	Aves	Aves	Caprimulgiformes	Apodidae
X		X		X	*Archilochus colubris*	Ruby-throated Hummingbird	Aves	Aves	Caprimulgiformes	Trochilidae
	X			X	*Cathartes aura*	Turkey Vulture	Aves	Aves	Cathartiformes	Cathartidae
		X			*Larus*	Large White-headed Gulls	Aves	Aves	Charadriiformes	Laridae
					Actitis macularius	Spotted Sandpiper	Aves	Aves	Charadriiformes	Scolopacidae
	X	X			*Scolopax minor*	American Woodcock	Aves	Aves	Charadriiformes	Scolopacidae
	X			X	*Tringa solitaria*	Solitary Sandpiper	Aves	Aves	Charadriiformes	Scolopacidae
X	X	X	X	X	*Zenaida macroura*	Mourning Dove	Aves	Aves	Columbiformes	Columbidae
	X	X	X	X	*Megaceryle alcyon*	Belted Kingfisher	Aves	Aves	Coraciiformes	Alcedinidae
	X				*Meleagris gallopavo*	Wild Turkey	Aves	Aves	Galliformes	Phasianidae
X	X	X	X	X	*Bombycilla cedrorum*	Cedar Waxwing	Aves	Aves	Passeriformes	Bombycillidae
X	X	X	X	X	*Cardinalis cardinalis*	Northern Cardinal	Aves	Aves	Passeriformes	Cardinalidae
		X			*Passerina cyanea*	Indigo Bunting	Aves	Aves	Passeriformes	Cardinalidae
	X		X		*Pheucticus ludovicianus*	Rose-breasted Grosbeak	Aves	Aves	Passeriformes	Cardinalidae
		X	X	X	*Piranga olivacea*	Scarlet Tanager	Aves	Aves	Passeriformes	Cardinalidae
X	X	X	X	X	*Certhia americana*	Brown Creeper	Aves	Aves	Passeriformes	Certhiidae

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X	X	X	X	X	*Corvus brachyrhynchos*	American Crow	Aves	Aves	Passeriformes	Corvidae
X		X			*Corvus corax*	Common Raven	Aves	Aves	Passeriformes	Corvidae
		X		X	*Corvus ossifragus*	Fish Crow	Aves	Aves	Passeriformes	Corvidae
X	X	X	X	X	*Cyanocitta cristata*	Blue Jay	Aves	Aves	Passeriformes	Corvidae
X	X	X		X	*Haemorhous mexicanus*	House Finch	Aves	Aves	Passeriformes	Fringillidae
					Haemorhous purpureus	Purple Finch	Aves	Aves	Passeriformes	Fringillidae
					Spinus pinus	Pine Siskin	Aves	Aves	Passeriformes	Fringillidae
X	X	X	X	X	*Spinus tristis*	American Goldfinch	Aves	Aves	Passeriformes	Fringillidae
X	X	X	X	X	*Hirundo rustica*	Barn Swallow	Aves	Aves	Passeriformes	Hirundinidae
	X	X	X		*Stelgidopteryx serripennis*	Northern Rough-winged Swallow	Aves	Aves	Passeriformes	Hirundinidae
	X		X	X	*Tachycineta bicolor*	Tree Swallow	Aves	Aves	Passeriformes	Hirundinidae
X	X	X	X	X	*Agelaius phoeniceus*	Red-winged Blackbird	Aves	Aves	Passeriformes	Icteridae
					Euphagus carolinus	Rusty Blackbird	Aves	Aves	Passeriformes	Icteridae
X	X	X	X	X	*Icterus galbula*	Baltimore Oriole	Aves	Aves	Passeriformes	Icteridae
	X	X	X	X	*Molothrus ater*	Brown-headed Cowbird	Aves	Aves	Passeriformes	Icteridae
X	X	X		X	*Quiscalus quiscula*	Common Grackle	Aves	Aves	Passeriformes	Icteridae
X	X	X	X	X	*Dumetella carolinensis*	Gray Catbird	Aves	Aves	Passeriformes	Mimidae
	X				*Mimus polyglottos*	Northern Mockingbird	Aves	Aves	Passeriformes	Mimidae
X	X	X	X	X	*Baeolophus bicolor*	Tufted Titmouse	Aves	Aves	Passeriformes	Paridae
X	X	X	X	X	*Poecile atricapillus*	Black-capped Chickadee	Aves	Aves	Passeriformes	Paridae
X	X	X	X	X	*Geothlypis trichas*	Common Yellowthroat	Aves	Aves	Passeriformes	Parulidae
				X	*Mniotilta varia*	Black-and-white Warbler	Aves	Aves	Passeriformes	Parulidae
				X	*Parkesia motacilla*	Louisiana Waterthrush	Aves	Aves	Passeriformes	Parulidae
X	X	X	X	X	*Seiurus aurocapilla*	Ovenbird	Aves	Aves	Passeriformes	Parulidae
		X		X	*Setophaga americana*	Northern Parula	Aves	Aves	Passeriformes	Parulidae
				X	*Setophaga caerulescens*	Black-throated Blue Warbler	Aves	Aves	Passeriformes	Parulidae
				X	*Setophaga castanea*	Bay-breasted Warbler	Aves	Aves	Passeriformes	Parulidae
					Setophaga coronata	Yellow-rumped Warbler	Aves	Aves	Passeriformes	Parulidae
	X			X	*Setophaga palmarum*	Palm Warbler	Aves	Aves	Passeriformes	Parulidae
	X				*Setophaga petechia*	Yellow Warbler	Aves	Aves	Passeriformes	Parulidae
X	X	X	X	X	*Setophaga pinus*	Pine Warbler	Aves	Aves	Passeriformes	Parulidae
				X	*Setophaga ruticilla*	American Redstart	Aves	Aves	Passeriformes	Parulidae
				X	*Setophaga striata*	Blackpoll Warbler	Aves	Aves	Passeriformes	Parulidae
				X	*Setophaga virens*	Black-throated Green Warbler	Aves	Aves	Passeriformes	Parulidae
X				X	*Junco hyemalis*	Dark-eyed Junco	Aves	Aves	Passeriformes	Passerellidae
X	X			X	*Melospiza georgiana*	Swamp Sparrow	Aves	Aves	Passeriformes	Passerellidae
X	X	X	X	X	*Melospiza melodia*	Song Sparrow	Aves	Aves	Passeriformes	Passerellidae
X					*Passerella iliaca*	Fox Sparrow	Aves	Aves	Passeriformes	Passerellidae
				X	*Pipilo erythrophthalmus*	Eastern Towhee	Aves	Aves	Passeriformes	Passerellidae
X	X	X	X	X	*Spizella passerina*	Chipping Sparrow	Aves	Aves	Passeriformes	Passerellidae
X		X			*Zonotrichia albicollis*	White-throated Sparrow	Aves	Aves	Passeriformes	Passerellidae
		X		X	*Passer domesticus*	House Sparrow	Aves	Aves	Passeriformes	Passeridae
	X	X	X	X	*Polioptila caerulea*	Blue-gray Gnatcatcher	Aves	Aves	Passeriformes	Polioptilidae
	X	X		X	*Corthylio calendula*	Ruby-crowned Kinglet	Aves	Aves	Passeriformes	Regulidae

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			X	X	*Regulus satrapa*	Golden-crowned Kinglet	Aves	Aves	Passeriformes	Regulidae
X	X	X	X	X	*Sitta canadensis*	Red-breasted Nuthatch	Aves	Aves	Passeriformes	Sittidae
X	X	X	X	X	*Sitta carolinensis*	White-breasted Nuthatch	Aves	Aves	Passeriformes	Sittidae
X	X	X	X	X	*Thryothorus ludovicianus*	Carolina Wren	Aves	Aves	Passeriformes	Troglodytidae
X	X		X		*Troglodytes aedon*	House Wren	Aves	Aves	Passeriformes	Troglodytidae
X	X	X	X	X	*Troglodytes hiemalis*	Winter Wren	Aves	Aves	Passeriformes	Troglodytidae
	X	X		X	*Catharus fuscescens*	Veery	Aves	Aves	Passeriformes	Turdidae
		X		X	*Catharus guttatus*	Hermit Thrush	Aves	Aves	Passeriformes	Turdidae
				X	*Catharus ustulatus*	Swainson's Thrush	Aves	Aves	Passeriformes	Turdidae
					Hylocichla mustelina	Wood Thrush	Aves	Aves	Passeriformes	Turdidae
X	X	X		X	*Sialia sialis*	Eastern Bluebird	Aves	Aves	Passeriformes	Turdidae
X	X	X	X	X	*Turdus migratorius*	American Robin	Aves	Aves	Passeriformes	Turdidae
X	X	X	X	X	*Contopus virens*	Eastern Wood-Pewee	Aves	Aves	Passeriformes	Tyrannidae
	X				*Empidonax alnorum*	Alder Flycatcher	Aves	Aves	Passeriformes	Tyrannidae
X	X	X	X	X	*Myiarchus crinitus*	Great Crested Flycatcher	Aves	Aves	Passeriformes	Tyrannidae
X	X	X	X	X	*Sayornis phoebe*	Eastern Phoebe	Aves	Aves	Passeriformes	Tyrannidae
X	X	X	X	X	*Tyrannus tyrannus*	Eastern Kingbird	Aves	Aves	Passeriformes	Tyrannidae
	X	X	X		*Vireo gilvus*	Warbling Vireo	Aves	Aves	Passeriformes	Vireonidae
	X	X	X	X	*Vireo olivaceus*	Red-eyed Vireo	Aves	Aves	Passeriformes	Vireonidae
				X	*Vireo solitarius*	Blue-headed Vireo	Aves	Aves	Passeriformes	Vireonidae
				X	*Ardea alba*	Great Egret	Aves	Aves	Pelecaniformes	Ardeidae
	X	X	X	X	*Ardea herodias*	Great Blue Heron	Aves	Aves	Pelecaniformes	Ardeidae
X	X	X			*Colaptes auratus*	Northern Flicker	Aves	Aves	Piciformes	Picidae
X	X	X	X	X	*Dryobates pubescens*	Downy Woodpecker	Aves	Aves	Piciformes	Picidae
X	X	X	X	X	*Dryobates villosus*	Hairy Woodpecker	Aves	Aves	Piciformes	Picidae
X	X	X	X	X	*Dryocopus pileatus*	Pileated Woodpecker	Aves	Aves	Piciformes	Picidae
X	X	X	X	X	*Melanerpes carolinus*	Red-bellied Woodpecker	Aves	Aves	Piciformes	Picidae
	X				*Bubo virginianus*	Great Horned Owl	Aves	Aves	Strigiformes	Strigidae
X		X		X	*Strix varia*	Barred Owl	Aves	Aves	Strigiformes	Strigidae
					Nannopterum auritum	Double-crested Cormorant	Aves	Aves	Suliformes	Phalacrocoracidae
	X				*Sylvilagus floridanus*	Eastern Cottontail	Mammalia	Mammalia	Lagomorpha	Leporidae
X	X	X		X	*Castor canadensis*	American Beaver	Mammalia	Mammalia	Rodentia	Castoridae
	X			X	*Erethizon dorsatum*	North American Porcupine	Mammalia	Mammalia	Rodentia	Erethizontidae
X					*Ondatra zibethicus*	Muskrat	Mammalia	Mammalia	Rodentia	Cricetidae
		X		X	*Peromyscus*	North American Deer Mice	Mammalia	Mammalia	Rodentia	Cricetidae
X	X	X	X	X	*Sciurus carolinensis*	Eastern Gray Squirrel	Mammalia	Mammalia	Rodentia	Sciuridae
X	X			X	*Tamiasciurus hudsonicus*	American Red Squirrel	Mammalia	Mammalia	Rodentia	Sciuridae
X	X	X	X	X	*Tamias striatus*	Eastern Chipmunk	Mammalia	Mammalia	Rodentia	Sciuridae
X					*Marmota monax*	Groundhog	Mammalia	Mammalia	Rodentia	Sciuridae
X	X	X		X	*Odocoileus virginianus*	White-tailed Deer	Mammalia	Mammalia	Artiodactyla	Cervidae
X	X	X		X	*Canis latrans*	Coyote	Mammalia	Mammalia	Carnivora	Canidae
			X	X	*Urocyon cinereoargenteus*	Gray Fox	Mammalia	Mammalia	Carnivora	Canidae
X			X		*Vulpes vulpes*	Red Fox	Mammalia	Mammalia	Carnivora	Canidae
X				X	*Lynx rufus*	Bobcat	Mammalia	Mammalia	Carnivora	Felidae

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	X		X	X	*Mephitis mephitis*	Striped Skunk	Mammalia	Mammalia	Carnivora	Mephitidae
				X	*Lontra canadensis*	North American River Otter	Mammalia	Mammalia	Carnivora	Mustelidae
X					*Mustela richardsonii*	Short-tailed Weasel	Mammalia	Mammalia	Carnivora	Mustelidae
X	X		X	X	*Procyon lotor*	Common Raccoon	Mammalia	Mammalia	Carnivora	Procyonidae
X	X		X	X	*Didelphis virginiana*	Virginia Opossum	Mammalia	Mammalia	Didelphimorphia	Didelphidae
		X		X	*Nerodia sipedon sipedon*	Northern Watersnake	Reptilia	Reptilia	Squamata	Colubridae
X					*Thamnophis saurita saurita*	Eastern Ribbon Snake	Reptilia	Reptilia	Squamata	Colubridae
	X	X	X		*Thamnophis sirtalis*	Common Garter Snake	Reptilia	Reptilia	Squamata	Colubridae
X					*Diadophis punctatus*	Ring-necked Snake	Reptilia	Reptilia	Squamata	Colubridae
	X			X	*Chelydra serpentina*	Common Snapping Turtle	Reptilia	Reptilia	Testudines	Chelydridae
X	X	X	X	X	*Chrysemys picta picta*	Eastern Painted Turtle	Reptilia	Reptilia	Testudines	Emydidae
	X				*Sternotherus odoratus*	Eastern Musk Turtle	Reptilia	Reptilia	Testudines	Kinosternidae
	X				*Elliptio complanata*	Eastern Elliptio	Mollusca	Bivalvia	Unionida	Unionidae
			X		*Cipangopaludina chinensis*	Chinese Mystery Snail	Mollusca	Gastropoda	Architaenioglossa	Viviparidae
				X	*Arion*	Arion Slugs	Mollusca	Gastropoda	Stylommatophora	Arionidae
				X	*Megapallifera mutabilis*	Changeable Mantleslug	Mollusca	Gastropoda	Stylommatophora	Philomycidae
		X			*Philomycus togatus*	Toga Mantleslug	Mollusca	Gastropoda	Stylommatophora	Philomycidae
		X	X	X	*Philomycidae*	Mantleslugs	Mollusca	Gastropoda	Stylommatophora	Philomycidae
				X	*Planorbella*		Mollusca	Gastropoda		Planorbidae
		X			*Litylenchus crenatae*	Beech Leaf Disease	Animalia	Chromadorea	Rhabditida	Anguinidae
		X			*Agrobacterium radiobacter*	bacterial crown gall		Alphaproteobacteria	Rhizobiales	Rhizobiaceae
		X		X	*Mycosphaerella colorata*	Mountain Laurel Leaf Spot	Fungi	Dothideomycetes	Mycosphaerellales	Mycosphaerellaceae
			X		*Apiosporina morbosa*	black knot	Fungi	Dothideomycetes	Venturiales	Venturiaceae
X					*Phaeophyscia*	wreath lichens	Fungi	Lecanoromycetes	Caliciales	Physciaceae
		X			*Cladonia furcata*	many-forked cladonia	Fungi	Lecanoromycetes	Lecanorales	Cladoniaceae
X		X			*Cladonia*	pixie cup and reindeer lichens	Fungi	Lecanoromycetes	Lecanorales	Cladoniaceae
		X	X		*Flavoparmelia baltimorensis*	rock greenshield lichen	Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
X			X	X	*Flavoparmelia caperata*	common greenshield lichen	Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
				X	*Hypogymnia physodes*	Hooded Tube Lichen	Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
		X		X	*Parmelia*	shield lichens	Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
	X			X	*Platismatia*		Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
		X	X	X	*Punctelia rudecta*	rough speckled shield lichen	Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
		X			*Usnea*	beard lichens	Fungi	Lecanoromycetes	Lecanorales	Parmeliaceae
	X	X	X	X	*Porpidia albocaerulescens*	Smokey-eyed Boulder Lichen	Fungi	Lecanoromycetes	Lecideales	Lecideaceae
			X		*Porpidia crustulata*	concentric boulder lichen	Fungi	Lecanoromycetes	Lecideales	Lecideaceae
		X			*Peltigera*	pelt lichens	Fungi	Lecanoromycetes	Peltigerales	Peltigeraceae
		X			*Diploschistes scruposus*	Crater Lichen	Fungi	Lecanoromycetes	Ostropales	Graphidaceae
X		X			*Graphis scripta*	Common Script Lichen	Fungi	Lecanoromycetes	Ostropales	Graphidaceae
		X			*Ochrolechia yasudae*	Coral Saucer	Fungi	Lecanoromycetes	Pertusariales	Ochrolechiaceae
			X		*Lasallia papulosa*	Common Toadskin Lichen	Fungi	Lecanoromycetes	Umbilicariales	Umbilicariaceae
		X	X		*Umbilicaria mammulata*	Smooth Rock Tripe	Fungi	Lecanoromycetes	Umbilicariales	Umbilicariaceae
		X			*Mitrula elegans*	swamp beacon	Fungi	Leotiomycetes	Helotiales	Mitrulaceae
				X	*Otidea onotica*	hare's ear	Fungi	Pezizomycetes	Pezizales	Otideaceae

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			X		*Chromelosporiopsis coerulescens*		Fungi	Pezizomycetes	Pezizales	Pezizaceae
				X	*Hypomyces chrysospermus*	bolete mould	Fungi	Sordariomycetes	Hypocreales	Hypocreaceae
		X			*Xylaria polymorpha*	dead man's fingers	Fungi	Sordariomycetes	Xylariales	Xylariaceae
		X			*Taphrina virginica*		Fungi	Taphrinomycetes	Taphrinales	Taphrinaceae
				X	*Cortinarius iodes*	Viscid Violet Cort	Fungi	Agaricomycetes	Agaricales	Cortinariaceae
				X	*Cortinarius violaceus*	violet webcap	Fungi	Agaricomycetes	Agaricales	Cortinariaceae
				X	*Laccaria laccata*	deceiver	Fungi	Agaricomycetes	Agaricales	Hydnangiaceae
X					*Lycoperdon perlatum*	common puffball	Fungi	Agaricomycetes	Agaricales	Lycoperdaceae
				X	*Gloioxanthomyces nitidus*	shining waxcap	Fungi	Agaricomycetes	Agaricales	Hygrophoraceae
		X		X	*Hygrocybe*	Waxcaps	Fungi	Agaricomycetes	Agaricales	Hygrophoraceae
				X	*Marasmius capillaris*		Fungi	Agaricomycetes	Agaricales	Marasmiaceae
			X	X	*Mycena galericulata*	common bonnet	Fungi	Agaricomycetes	Agaricales	Mycenaceae
			X		*Mycena inclinata*	clustered bonnet	Fungi	Agaricomycetes	Agaricales	Mycenaceae
		X	X	X	*Mycena*	Bonnets	Fungi	Agaricomycetes	Agaricales	Mycenaceae
				X	*Armillaria ostoyae*	Honey Mushroom	Fungi	Agaricomycetes	Agaricales	Physalacriaceae
				X	*Armillaria sinapina*		Fungi	Agaricomycetes	Agaricales	Physalacriaceae
				X	*Megacollybia rodmanii*	Eastern American Platterful Mushroom	Fungi	Agaricomycetes	Agaricales	Porotheleaceae
				X	*Xeromphalina campanella*	Pinewood Gingertail	Fungi	Agaricomycetes	Agaricales	Xeromphalinaceae
				X	*Xeromphalina kauffmanii*	Cross-veined Troop Mushroom	Fungi	Agaricomycetes	Agaricales	Xeromphalinaceae
				X	*Tricholomopsis decora*	Decorated Mop	Fungi	Agaricomycetes	Agaricales	Phyllotopsidaceae
				X	*Radulomyces copelandii*	Asian Beauty	Fungi	Agaricomycetes	Agaricales	Radulomycetaceae
				X	*Amanita lavendula*	Coker's Lavender Staining Amanita	Fungi	Agaricomycetes	Agaricales	Amanitaceae
				X	*Amanita rubescens*	blusher	Fungi	Agaricomycetes	Agaricales	Amanitaceae
	X	X		X	*Amanita*	amanita mushrooms	Fungi	Agaricomycetes	Agaricales	Amanitaceae
				X	*Pluteus*	Deer Mushrooms	Fungi	Agaricomycetes	Agaricales	Pluteaceae
				X	*Fistulina*		Fungi	Agaricomycetes	Agaricales	Schizophyllaceae
		X			*Schizophyllum commune*	splitgill mushroom	Fungi	Agaricomycetes	Agaricales	Schizophyllaceae
				X	*Entoloma strictius*	Straight-stalked Entoloma	Fungi	Agaricomycetes	Agaricales	Entolomataceae
X					*Infundibulicybe gibba*	Common Funnel	Fungi	Agaricomycetes	Agaricales	Omphalinaceae
		X			*Scleroderma*	earthballs	Fungi	Agaricomycetes	Boletales	Sclerodermataceae
				X	*Suillus brevipes*	Short-stalked Suillus	Fungi	Agaricomycetes	Boletales	Suillaceae
X		X		X	*Suillus spraguei*	Painted Suillus	Fungi	Agaricomycetes	Boletales	Suillaceae
				X	*Suillus weaverae*	Butterball	Fungi	Agaricomycetes	Boletales	Suillaceae
				X	*Imleria pallida*	pallid bolete	Fungi	Agaricomycetes	Boletales	Boletaceae
				X	*Tylopilus*		Fungi	Agaricomycetes	Boletales	Boletaceae
		X			*Xerocomellus chrysenteron*	Red-cracking Bolete	Fungi	Agaricomycetes	Boletales	Boletaceae
				X	*Leccinum*		Fungi	Agaricomycetes	Boletales	Boletaceae
			X	X	*Exsudoporus frostii*	Frost's Bolete	Fungi	Agaricomycetes	Boletales	Boletaceae
X					*Aureoboletus russellii*	Russell's Bolete	Fungi	Agaricomycetes	Boletales	Boletaceae
				X	*Hortiboletus rubellus*	Ruby Bolete	Fungi	Agaricomycetes	Boletales	Boletaceae
X				X	*Strobilomyces strobilaceus*	Old-man-of-the-woods	Fungi	Agaricomycetes	Boletales	Boletaceae
X		X		X	*Strobilomyces*		Fungi	Agaricomycetes	Boletales	Boletaceae
		X			*Ramaria stricta*	Upright Coral Fungus	Fungi	Agaricomycetes	Gomphales	Gomphaceae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
		X		X	*Cantharellus cinnabarinus*	Red Chanterelle	Fungi	Agaricomycetes	Cantharellales	Hydnaceae
				X	*Craterellus fallax*	Eastern Black Trumpet	Fungi	Agaricomycetes	Cantharellales	Hydnaceae
X		X			*Craterellus*	Trumpets	Fungi	Agaricomycetes	Cantharellales	Hydnaceae
		X			*Tulasnella*		Fungi	Agaricomycetes	Cantharellales	Tulasnellaceae
				X	*Coltricia cinnamomea*	Shiny cinnamon polypore	Fungi	Agaricomycetes	Hymenochaetales	Coltriciaceae
		X		X	*Trichaptum biforme*	violet-toothed polypore	Fungi	Agaricomycetes	Hymenochaetales	Hymenochaetaceae
		X		X	*Fomitopsis betulina*	birch polypore	Fungi	Agaricomycetes	Polyporales	Fomitopsidaceae
		X			*Laetiporus sulphureus*	chicken of the woods	Fungi	Agaricomycetes	Polyporales	Laetiporaceae
X		X	X		*Laetiporus*		Fungi	Agaricomycetes	Polyporales	Laetiporaceae
X					*Phaeolus schweinitzii*	Dyer's Polypore	Fungi	Agaricomycetes	Polyporales	Phaeolaceae
	X				*Cerioporus squamosus*	Dryad's Saddle	Fungi	Agaricomycetes	Polyporales	Polyporaceae
X		X			*Fomes excavatus*	Tinder Polypore	Fungi	Agaricomycetes	Polyporales	Polyporaceae
X		X			*Artomyces pyxidatus*	crown-tipped coral fungus	Fungi	Agaricomycetes	Russulales	Auriscalpiaceae
X				X	*Lactifluus*		Fungi	Agaricomycetes	Russulales	Russulaceae
				X	*Russula emetica*	the sickener	Fungi	Agaricomycetes	Russulales	Russulaceae
		X		X	*Russula*	brittlegills	Fungi	Agaricomycetes	Russulales	Russulaceae
			X		*Aleurodiscus oakesii*	Smooth Patch Disease	Fungi	Agaricomycetes	Russulales	Stereaceae
			X		*Stereum lobatum*		Fungi	Agaricomycetes	Russulales	Stereaceae
X		X	X	X	*Stereum*		Fungi	Agaricomycetes	Russulales	Stereaceae
X			X	X	*Sebacina schweinitzii*	jellied false coral fungus	Fungi	Agaricomycetes	Sebacinales	Sebacinaceae
				X	*Sebacina*		Fungi	Agaricomycetes	Sebacinales	Sebacinaceae
				X	*Thelephora terrestris*	Common Fiber Vase	Fungi	Agaricomycetes	Thelephorales	Thelephoraceae
		X			*Dacrymyces chrysospermus*	Orange Jelly Spot	Fungi	Dacrymycetes	Dacrymycetales	Dacrymycetaceae
				X	*Dacrymyces stillatus*	Jelly Spot Fungus	Fungi	Dacrymycetes	Dacrymycetales	Dacrymycetaceae
X		X			*Calyptospora columnaris*	Huckleberry Broom Rust Fungus	Fungi	Pucciniomycetes	Pucciniales	Pucciniastraceae
X					*Puccinia coronata*	Crown Rust	Fungi	Pucciniomycetes	Pucciniales	Pucciniaceae
				X	*Uromyces halstedii*		Fungi	Pucciniomycetes	Pucciniales	Pucciniaceae
X	X				*Exobasidium*		Fungi	Exobasidiomycetes	Exobasidiales	Exobasidiaceae
	X				*Anthracoidea caricis*		Fungi	Ustilaginomycetes	Ustilaginales	Anthracoideaceae
		X			*Entomophaga grylli*		Fungi	Entomophthoromycetes	Entomophthorales	Entomophthoraceae
		X			*Bartramia pomiformis*	Common Apple-moss	Plantae	Bryopsida	Bartramiales	Bartramiaceae
X		X			*Plagiomnium*	Thyme and Allied Mosses	Plantae	Bryopsida	Bryales	Mniaceae
		X	X		*Dicranum*	Forkmosses	Plantae	Bryopsida	Dicranales	Dicranaceae
			X		*Leucobryum glaucum*	Pincushion Moss	Plantae	Bryopsida	Dicranales	Leucobryaceae
X		X	X		*Leucobryum*	Leucobryum mosses	Plantae	Bryopsida	Dicranales	Leucobryaceae
X		X			*Hedwigia ciliata*	Ciliate Hoarmoss	Plantae	Bryopsida	Hedwigiales	Hedwigiaceae
	X	X			*Climacium*	Climacium Mosses	Plantae	Bryopsida	Hypnales	Climaciaceae
		X			*Fontinalis antipyretica*	Willow Moss	Plantae	Bryopsida	Hypnales	Fontinalaceae
		X			*Fontinalis hypnoides*		Plantae	Bryopsida	Hypnales	Fontinalaceae
				X	*Fontinalis novae-angliae*	New England Willowmoss	Plantae	Bryopsida	Hypnales	Fontinalaceae
		X			*Hylocomiadelphus triquetrus*	rough goose neck moss	Plantae	Bryopsida	Hypnales	Hylocomiaceae
X					*Pleurozium schreberi*	Red-stemmed Feather Moss	Plantae	Bryopsida	Hypnales	Hylocomiaceae
		X			*Callicladium haldanianum*	Beautiful Branch Moss	Plantae	Bryopsida	Hypnales	Hypnaceae
	X	X	X		*Callicladium imponens*	brocade moss	Plantae	Bryopsida	Hypnales	Hypnaceae

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		X			*Pseudanomodon attenuatus*	tree-skirt moss	Plantae	Bryopsida	Hypnales	Neckeraceae
		X		X	*Thuidium*	fern mosses	Plantae	Bryopsida	Hypnales	Thuidiaceae
X		X	X	X	*Ulota*		Plantae	Bryopsida	Orthotrichales	Orthotrichaceae
	X				*Atrichum*	Smoothcap Mosses	Plantae	Polytrichopsida	Polytrichales	Polytrichaceae
X		X		X	*Polytrichum commune*	Common Haircap Moss	Plantae	Polytrichopsida	Polytrichales	Polytrichaceae
X		X			*Polytrichum juniperinum*	juniper haircap moss	Plantae	Polytrichopsida	Polytrichales	Polytrichaceae
X	X	X	X		*Sphagnum*	Sphagnum mosses	Plantae	Sphagnopsida	Sphagnales	Sphagnaceae
		X			*Cuspidata*	Sphagnum Subg. Cuspidata	Plantae	Sphagnopsida	Sphagnales	Sphagnaceae
X		X			*Bazzania trilobata*	greater whipwort	Plantae	Jungermanniopsida	Jungermanniales	Lepidoziaceae
X		X	X		*Frullania eboracensis*	New York Scalewort	Plantae	Jungermanniopsida	Porellales	Frullaniaceae
				X	*Sagittaria latifolia*	broadleaf arrowhead	Plantae	Liliopsida	Alismatales	Alismataceae
		X			*Arisaema stewardsonii*	bog Jack-in-the-pulpit	Plantae	Liliopsida	Alismatales	Araceae
X		X	X		*Arisaema triphyllum*	Jack-in-the-Pulpit	Plantae	Liliopsida	Alismatales	Araceae
	X	X	X		*Symplocarpus foetidus*	Eastern Skunk Cabbage	Plantae	Liliopsida	Alismatales	Araceae
				X	*Allium vineale*	wild garlic	Plantae	Liliopsida	Asparagales	Amaryllidaceae
X	X	X	X	X	*Maianthemum canadense*	Canada mayflower	Plantae	Liliopsida	Asparagales	Asparagaceae
X		X		X	*Maianthemum racemosum*	Solomon's plume	Plantae	Liliopsida	Asparagales	Asparagaceae
		X	X	X	*Polygonatum pubescens*	hairy Solomon's-seal	Plantae	Liliopsida	Asparagales	Asparagaceae
		X		X	*Iris versicolor*	northern blue flag	Plantae	Liliopsida	Asparagales	Iridaceae
X	X		X	X	*Cypripedium acaule*	pink lady's slipper	Plantae	Liliopsida	Asparagales	Orchidaceae
		X			*Epipactis helleborine*	Broad-leaved helleborine	Plantae	Liliopsida	Asparagales	Orchidaceae
		X		X	*Goodyera pubescens*	downy rattlesnake plantain	Plantae	Liliopsida	Asparagales	Orchidaceae
				X	*Pontederia cordata*	pickerelweed	Plantae	Liliopsida	Commelinales	Pontederiaceae
X	X	X			*Uvularia sessilifolia*	sessile bellwort	Plantae	Liliopsida	Liliales	Colchicaceae
X	X			X	*Medeola virginiana*	Cucumber Root	Plantae	Liliopsida	Liliales	Liliaceae
		X			*Veratrum viride*	green false hellebore	Plantae	Liliopsida	Liliales	Melanthiaceae
		X			*Trillium cernuum*	nodding trillium	Plantae	Liliopsida	Liliales	Melanthiaceae
	X	X			*Trillium*	Erectum-group Trilliums	Plantae	Liliopsida	Liliales	Melanthiaceae
	X	X			*Smilax herbacea*	smooth carrionflower	Plantae	Liliopsida	Liliales	Smilacaceae
	X		X		*Smilax rotundifolia*	roundleaf greenbrier	Plantae	Liliopsida	Liliales	Smilacaceae
X	X	X	X		*Smilax*	greenbriers	Plantae	Liliopsida	Liliales	Smilacaceae
				X	*Carex folliculata*	northern long sedge	Plantae	Liliopsida	Poales	Cyperaceae
	X	X		X	*Carex intumescens*	bladder sedge	Plantae	Liliopsida	Poales	Cyperaceae
	X	X		X	*Carex lupulina*	hop sedge	Plantae	Liliopsida	Poales	Cyperaceae
X				X	*Carex lurida*	sallow sedge	Plantae	Liliopsida	Poales	Cyperaceae
	X				*Carex pensylvanica*	Pennsylvania sedge	Plantae	Liliopsida	Poales	Cyperaceae
			X		*Carex plantaginea*	plantainleaf sedge	Plantae	Liliopsida	Poales	Cyperaceae
	X				*Carex scoparia*	pointed broom sedge	Plantae	Liliopsida	Poales	Cyperaceae
			X		*Carex rosea*	Carex Rosea Clade	Plantae	Liliopsida	Poales	Cyperaceae
				X	*Dulichium arundinaceum*	Three-way Sedge	Plantae	Liliopsida	Poales	Cyperaceae
	X				*Scirpus atrovirens*	dark green bulrush	Plantae	Liliopsida	Poales	Cyperaceae
	X			X	*Scirpus*	Scirpus Bulrushes	Plantae	Liliopsida	Poales	Cyperaceae
		X			*Phragmites australis*	common reed	Plantae	Liliopsida	Poales	Poaceae
X					*Dichanthelium clandestinum*	deertongue	Plantae	Liliopsida	Poales	Poaceae

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X		X			*Dichanthelium*	rosette grasses	Plantae	Liliopsida	Poales	Poaceae
				X	*Sparganium americanum*	American bur-reed	Plantae	Liliopsida	Poales	Typhaceae
				X	*Cicuta maculata*	water hemlock	Plantae	Magnoliopsida	Apiales	Apiaceae
				X	*Sium suave*	water parsnip	Plantae	Magnoliopsida	Apiales	Apiaceae
	X				*Daucus carota*	Queen Anne's lace	Plantae	Magnoliopsida	Apiales	Apiaceae
X	X			X	*Apiaceae*	carrot family	Plantae	Magnoliopsida	Apiales	Apiaceae
X		X	X	X	*Aralia nudicaulis*	wild sarsaparilla	Plantae	Magnoliopsida	Apiales	Araliaceae
X					*Ilex mucronata*	Mountain holly	Plantae	Magnoliopsida	Aquifoliales	Aquifoliaceae
				X	*Ilex verticillata*	winterberry holly	Plantae	Magnoliopsida	Aquifoliales	Aquifoliaceae
		X			*Erigeron*	fleabanes and horseweeds	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Eurybia divaricata*	White Wood Aster	Plantae	Magnoliopsida	Asterales	Asteraceae
		X		X	*Oclemena acuminata*	whorled wood aster	Plantae	Magnoliopsida	Asterales	Asteraceae
	X	X			*Solidago arguta*	cut-leaf goldenrod	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Solidago caesia*	bluestem goldenrod	Plantae	Magnoliopsida	Asterales	Asteraceae
	X				*Solidago rugosa*	common wrinkle-leaved goldenrod	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Symphyotrichum*	American asters	Plantae	Magnoliopsida	Asterales	Asteraceae
				X	*Bidens connata*	Purplestem Beggarticks	Plantae	Magnoliopsida	Asterales	Asteraceae
		X		X	*Bidens*	Beggarticks	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Antennaria*	pussytoes	Plantae	Magnoliopsida	Asterales	Asteraceae
	X	X			*Rudbeckia hirta*	black-eyed Susan	Plantae	Magnoliopsida	Asterales	Asteraceae
	X				*Arctium*	burdocks	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Cirsium vulgare*	Bull Thistle	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Centaurea jacea*	Brown Knapweed	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Cichorium intybus*	chicory	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Nabalus trifoliolatus*	three-leaved rattlesnake root	Plantae	Magnoliopsida	Asterales	Asteraceae
		X		X	*Nabalus*	rattlesnake roots	Plantae	Magnoliopsida	Asterales	Asteraceae
	X				*Taraxacum officinale*	common dandelion	Plantae	Magnoliopsida	Asterales	Asteraceae
X	X				*Taraxacum*	dandelions	Plantae	Magnoliopsida	Asterales	Asteraceae
		X			*Hieracium*	hawkweeds	Plantae	Magnoliopsida	Asterales	Asteraceae
	X				*Tragopogon dubius*	Yellow Salsify	Plantae	Magnoliopsida	Asterales	Asteraceae
	X				*Tragopogon pratensis*	meadow salsify	Plantae	Magnoliopsida	Asterales	Asteraceae
			X	X	*Lobelia cardinalis*	cardinal flower	Plantae	Magnoliopsida	Asterales	Campanulaceae
				X	*Alliaria petiolata*	garlic mustard	Plantae	Magnoliopsida	Brassicales	Brassicaceae
	X				*Barbarea vulgaris*	garden yellowrocket	Plantae	Magnoliopsida	Brassicales	Brassicaceae
X	X				*Barbarea*	wintercresses	Plantae	Magnoliopsida	Brassicales	Brassicaceae
		X		X	*Cardamine pensylvanica*	Pennsylvania Bittercress	Plantae	Magnoliopsida	Brassicales	Brassicaceae
	X				*Turritis glabra*	Tower Mustard	Plantae	Magnoliopsida	Brassicales	Brassicaceae
		X			*Dianthus armeria*	Deptford pink	Plantae	Magnoliopsida	Caryophyllales	Caryophyllaceae
		X			*Silene flos-cuculi*	ragged-robin	Plantae	Magnoliopsida	Caryophyllales	Caryophyllaceae
	X				*Stellaria*	chickweeds	Plantae	Magnoliopsida	Caryophyllales	Caryophyllaceae
X				X	*Phytolacca americana*	American pokeweed	Plantae	Magnoliopsida	Caryophyllales	Phytolaccaceae
				X	*Persicaria arifolia*	halberd-leaved tearthumb	Plantae	Magnoliopsida	Caryophyllales	Polygonaceae
		X			*Persicaria extremiorientalis*	Far Eastern smartweed	Plantae	Magnoliopsida	Caryophyllales	Polygonaceae
				X	*Persicaria hydropiperoides*	swamp smartweed	Plantae	Magnoliopsida	Caryophyllales	Polygonaceae

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X		X		X	*Persicaria*	knotweeds, smartweeds, and waterpeppers	Plantae	Magnoliopsida	Caryophyllales	Polygonaceae
	X				*Reynoutria japonica*	Japanese knotweed	Plantae	Magnoliopsida	Caryophyllales	Polygonaceae
		X		X	*Celastrus orbiculatus*	Oriental bittersweet	Plantae	Magnoliopsida	Celastrales	Celastraceae
	X			X	*Celastrus*	bittersweets	Plantae	Magnoliopsida	Celastrales	Celastraceae
X	X	X		X	*Euonymus alatus*	winged euonymus	Plantae	Magnoliopsida	Celastrales	Celastraceae
		X		X	*Cornus alternifolia*	alternate-leaved dogwood	Plantae	Magnoliopsida	Cornales	Cornaceae
	X				*Cornus amomum*	silky dogwood	Plantae	Magnoliopsida	Cornales	Cornaceae
				X	*Cornus canadensis*	Canadian bunchberry	Plantae	Magnoliopsida	Cornales	Cornaceae
		X			*Cornus rugosa*	Round-leaved Dogwood	Plantae	Magnoliopsida	Cornales	Cornaceae
		X	X		*Nyssa sylvatica*	Black Tupelo	Plantae	Magnoliopsida	Cornales	Nyssaceae
	X				*Echinocystis lobata*	wild cucumber	Plantae	Magnoliopsida	Cucurbitales	Cucurbitaceae
	X				*Lonicera morrowii*	Morrow's honeysuckle	Plantae	Magnoliopsida	Dipsacales	Caprifoliaceae
		X	X	X	*Diervilla lonicera*	northern bush honeysuckle	Plantae	Magnoliopsida	Dipsacales	Caprifoliaceae
X	X	X	X	X	*Viburnum acerifolium*	mapleleaf viburnum	Plantae	Magnoliopsida	Dipsacales	Viburnaceae
		X		X	*Viburnum cassinoides*	northern wild raisin	Plantae	Magnoliopsida	Dipsacales	Viburnaceae
X	X			X	*Viburnum dentatum*	southern arrowwood	Plantae	Magnoliopsida	Dipsacales	Viburnaceae
				X	*Viburnum rafinesqueanum*	downy arrowwood	Plantae	Magnoliopsida	Dipsacales	Viburnaceae
X				X	*Impatiens capensis*	common jewelweed	Plantae	Magnoliopsida	Ericales	Balsaminaceae
X	X			X	*Impatiens*	touch-me-nots	Plantae	Magnoliopsida	Ericales	Balsaminaceae
X		X			*Clethra alnifolia*	Sweet Pepperbush	Plantae	Magnoliopsida	Ericales	Clethraceae
X	X	X	X	X	*Kalmia angustifolia*	sheep laurel	Plantae	Magnoliopsida	Ericales	Ericaceae
		X	X	X	*Kalmia latifolia*	mountain laurel	Plantae	Magnoliopsida	Ericales	Ericaceae
	X				*Rhododendron canadense*	Rhodora	Plantae	Magnoliopsida	Ericales	Ericaceae
X					*Rhododendron viscosum*	swamp azalea	Plantae	Magnoliopsida	Ericales	Ericaceae
		X	X	X	*Chimaphila maculata*	striped wintergreen	Plantae	Magnoliopsida	Ericales	Ericaceae
X		X	X	X	*Chimaphila umbellata*	pipsissewa	Plantae	Magnoliopsida	Ericales	Ericaceae
X					*Monotropa hypopitys*	pinesap	Plantae	Magnoliopsida	Ericales	Ericaceae
X	X	X	X	X	*Monotropa uniflora*	Ghost Pipe	Plantae	Magnoliopsida	Ericales	Ericaceae
	X	X		X	*Pyrola elliptica*	shinleaf	Plantae	Magnoliopsida	Ericales	Ericaceae
				X	*Chamaedaphne calyculata*	leatherleaf	Plantae	Magnoliopsida	Ericales	Ericaceae
X		X	X	X	*Gaultheria procumbens*	Eastern Teaberry	Plantae	Magnoliopsida	Ericales	Ericaceae
	X			X	*Lyonia ligustrina*	He-huckleberry	Plantae	Magnoliopsida	Ericales	Ericaceae
				X	*Gaylussacia baccata*	black huckleberry	Plantae	Magnoliopsida	Ericales	Ericaceae
	X			X	*Gaylussacia*	huckleberries	Plantae	Magnoliopsida	Ericales	Ericaceae
			X	X	*Vaccinium angustifolium*	lowbush blueberry	Plantae	Magnoliopsida	Ericales	Ericaceae
X	X	X		X	*Vaccinium corymbosum*	Northern highbush blueberry	Plantae	Magnoliopsida	Ericales	Ericaceae
				X	*Vaccinium myrtilloides*	velvetleaf blueberry	Plantae	Magnoliopsida	Ericales	Ericaceae
			X		*Vaccinium pallidum*	Early Lowbush Blueberry	Plantae	Magnoliopsida	Ericales	Ericaceae
X	X	X	X	X	*Lysimachia borealis*	northern starflower	Plantae	Magnoliopsida	Ericales	Primulaceae
		X		X	*Lysimachia quadrifolia*	whorled loosestrife	Plantae	Magnoliopsida	Ericales	Primulaceae
	X				*Lysimachia terrestris*	swamp candles	Plantae	Magnoliopsida	Ericales	Primulaceae
		X			*Lupinus polyphyllus*	Large-leaved lupine	Plantae	Magnoliopsida	Fabales	Fabaceae
		X			*Lotus corniculatus*	bird's-foot trefoil	Plantae	Magnoliopsida	Fabales	Fabaceae

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	X	X			*Amphicarpaea bracteata*	American hog-peanut	Plantae	Magnoliopsida	Fabales	Fabaceae
	X				*Apios americana*	American groundnut	Plantae	Magnoliopsida	Fabales	Fabaceae
	X	X			*Trifolium pratense*	Red Clover	Plantae	Magnoliopsida	Fabales	Fabaceae
		X			*Trifolium repens*	white clover	Plantae	Magnoliopsida	Fabales	Fabaceae
				X	*Polygaloides paucifolia*	fringed polygala	Plantae	Magnoliopsida	Fabales	Polygalaceae
	X				*Alnus*	alders	Plantae	Magnoliopsida	Fagales	Betulaceae
X		X			*Betula alleghaniensis*	yellow birch	Plantae	Magnoliopsida	Fagales	Betulaceae
				X	*Betula lenta*	sweet birch	Plantae	Magnoliopsida	Fagales	Betulaceae
X		X		X	*Betula papyrifera*	paper birch	Plantae	Magnoliopsida	Fagales	Betulaceae
	X	X		X	*Betula populifolia*	gray birch	Plantae	Magnoliopsida	Fagales	Betulaceae
		X		X	*Carpinus caroliniana*	American hornbeam	Plantae	Magnoliopsida	Fagales	Betulaceae
	X			X	*Corylus americana*	American hazelnut	Plantae	Magnoliopsida	Fagales	Betulaceae
X		X			*Corylus cornuta*	beaked hazelnut	Plantae	Magnoliopsida	Fagales	Betulaceae
X		X	X		*Ostrya virginiana*	American hophornbeam	Plantae	Magnoliopsida	Fagales	Betulaceae
			X		*Castanea dentata*	American chestnut	Plantae	Magnoliopsida	Fagales	Fagaceae
		X			*Fagus grandifolia*	American beech	Plantae	Magnoliopsida	Fagales	Fagaceae
X	X	X	X	X	*Quercus alba*	white oak	Plantae	Magnoliopsida	Fagales	Fagaceae
		X			*Quercus bicolor*	swamp white oak	Plantae	Magnoliopsida	Fagales	Fagaceae
			X		*Quercus coccinea*	scarlet oak	Plantae	Magnoliopsida	Fagales	Fagaceae
		X		X	*Quercus rubra*	northern red oak	Plantae	Magnoliopsida	Fagales	Fagaceae
X	X			X	*Quercus velutina*	black oak	Plantae	Magnoliopsida	Fagales	Fagaceae
X	X	X	X	X	*Quercus*	oaks	Plantae	Magnoliopsida	Fagales	Fagaceae
	X				*Carya glabra*	pignut hickory	Plantae	Magnoliopsida	Fagales	Juglandaceae
	X	X	X	X	*Carya*	hickories	Plantae	Magnoliopsida	Fagales	Juglandaceae
		X		X	*Comptonia peregrina*	sweet-fern	Plantae	Magnoliopsida	Fagales	Myricaceae
	X	X	X	X	*Apocynum androsaemifolium*	spreading dogbane	Plantae	Magnoliopsida	Gentianales	Apocynaceae
	X				*Asclepias exaltata*	poke milkweed	Plantae	Magnoliopsida	Gentianales	Apocynaceae
	X	X			*Asclepias syriaca*	common milkweed	Plantae	Magnoliopsida	Gentianales	Apocynaceae
	X				*Vincetoxicum nigrum*	black swallow-wort	Plantae	Magnoliopsida	Gentianales	Apocynaceae
				X	*Cephalanthus occidentalis*	buttonbush	Plantae	Magnoliopsida	Gentianales	Rubiaceae
X	X	X	X	X	*Mitchella repens*	partridgeberry	Plantae	Magnoliopsida	Gentianales	Rubiaceae
		X			*Galium triflorum*	fragrant bedstraw	Plantae	Magnoliopsida	Gentianales	Rubiaceae
	X	X		X	*Galium*	bedstraws	Plantae	Magnoliopsida	Gentianales	Rubiaceae
X	X	X		X	*Houstonia caerulea*	azure bluet	Plantae	Magnoliopsida	Gentianales	Rubiaceae
		X	X	X	*Geranium maculatum*	wild geranium	Plantae	Magnoliopsida	Geraniales	Geraniaceae
		X	X	X	*Geranium*	geraniums and cranesbills	Plantae	Magnoliopsida	Geraniales	Geraniaceae
	X				*Lycopus americanus*	American bugleweed	Plantae	Magnoliopsida	Lamiales	Lamiaceae
X	X			X	*Lycopus*	water horehounds	Plantae	Magnoliopsida	Lamiales	Lamiaceae
				X	*Prunella vulgaris*	common selfheal	Plantae	Magnoliopsida	Lamiales	Lamiaceae
X					*Scutellaria lateriflora*	side-flowering skullcap	Plantae	Magnoliopsida	Lamiales	Lamiaceae
				X	*Utricularia macrorhiza*	common bladderwort	Plantae	Magnoliopsida	Lamiales	Lentibulariaceae
X		X		X	*Fraxinus americana*	white ash	Plantae	Magnoliopsida	Lamiales	Oleaceae
	X	X			*Melampyrum lineare*	narrowleaf cow wheat	Plantae	Magnoliopsida	Lamiales	Orobanchaceae
		X			*Nuttallanthus canadensis*	blue toadflax	Plantae	Magnoliopsida	Lamiales	Plantaginaceae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
				X	*Chelone glabra*	white turtlehead	Plantae	Magnoliopsida	Lamiales	Plantaginaceae
		X		X	*Chelone*	Turtleheads	Plantae	Magnoliopsida	Lamiales	Plantaginaceae
		X			*Plantago major*	greater plantain	Plantae	Magnoliopsida	Lamiales	Plantaginaceae
		X		X	*Plantago*	plantains	Plantae	Magnoliopsida	Lamiales	Plantaginaceae
X					*Veronica officinalis*	heath speedwell	Plantae	Magnoliopsida	Lamiales	Plantaginaceae
X			X		*Verbascum thapsus*	great mullein	Plantae	Magnoliopsida	Lamiales	Scrophulariaceae
X					*Verbena hastata*	blue vervain	Plantae	Magnoliopsida	Lamiales	Verbenaceae
			X		*Sassafras albidum*	sassafras	Plantae	Magnoliopsida	Laurales	Lauraceae
		X			*Hypericum perforatum*	Common St. John's Wort	Plantae	Magnoliopsida	Malpighiales	Hypericaceae
	X	X		X	*Populus grandidentata*	bigtooth aspen	Plantae	Magnoliopsida	Malpighiales	Salicaceae
	X				*Salix*	Willows	Plantae	Magnoliopsida	Malpighiales	Salicaceae
				X	*Viola cucullata*	marsh blue violet	Plantae	Magnoliopsida	Malpighiales	Violaceae
		X			*Viola fimbriatula*	downy blue violet	Plantae	Magnoliopsida	Malpighiales	Violaceae
	X	X		X	*Viola*	violets	Plantae	Magnoliopsida	Malpighiales	Violaceae
X	X	X		X	*Tilia americana*	basswood	Plantae	Magnoliopsida	Malvales	Malvaceae
X					*Decodon verticillatus*	swamp loosestrife	Plantae	Magnoliopsida	Myrtales	Lythraceae
				X	*Lythrum salicaria*	purple loosestrife	Plantae	Magnoliopsida	Myrtales	Lythraceae
		X			*Circaea canadensis*	broadleaf enchanter's nightshade	Plantae	Magnoliopsida	Myrtales	Onagraceae
X		X			*Circaea*	enchanter's nightshades	Plantae	Magnoliopsida	Myrtales	Onagraceae
				X	*Nymphaea odorata*	American white waterlily	Plantae	Magnoliopsida	Nymphaeales	Nymphaeaceae
				X	*Oxalis stricta*	upright yellow woodsorrel	Plantae	Magnoliopsida	Oxalidales	Oxalidaceae
X	X	X		X	*Berberis thunbergii*	Japanese barberry	Plantae	Magnoliopsida	Ranunculales	Berberidaceae
	X				*Berberis vulgaris*	European barberry	Plantae	Magnoliopsida	Ranunculales	Berberidaceae
		X			*Capnoides sempervirens*	rock harlequin	Plantae	Magnoliopsida	Ranunculales	Papaveraceae
X	X				*Chelidonium majus*	Greater celandine	Plantae	Magnoliopsida	Ranunculales	Papaveraceae
		X		X	*Coptis trifolia*	threeleaf goldthread	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
		X			*Actaea pachypoda*	white baneberry	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
	X	X	X	X	*Anemonoides quinquefolia*	wood anemone	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
		X			*Clematis virginiana*	virgin's-bower	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
		X			*Hepatica americana*	round-lobed hepatica	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
	X				*Ranunculus abortivus*	small-flowered buttercup	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
		X			*Ranunculus recurvatus*	Hooked buttercup	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
		X	X		*Aquilegia canadensis*	red columbine	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
				X	*Thalictrum dioicum*	early meadow-rue	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
	X	X			*Thalictrum thalictroides*	rue anemone	Plantae	Magnoliopsida	Ranunculales	Ranunculaceae
X	X			X	*Elaeagnus umbellata*	autumn olive	Plantae	Magnoliopsida	Rosales	Elaeagnaceae
X		X	X	X	*Frangula alnus*	glossy buckthorn	Plantae	Magnoliopsida	Rosales	Rhamnaceae
X	X		X		*Rhamnus cathartica*	common buckthorn	Plantae	Magnoliopsida	Rosales	Rhamnaceae
	X	X			*Prunus serotina*	black cherry	Plantae	Magnoliopsida	Rosales	Rosaceae
	X				*Prunus virginiana*	chokecherry	Plantae	Magnoliopsida	Rosales	Rosaceae
		X	X		*Prunus*	plums, cherries, and allies	Plantae	Magnoliopsida	Rosales	Rosaceae
		X			*Amelanchier*	serviceberries	Plantae	Magnoliopsida	Rosales	Rosaceae
		X	X	X	*Aronia*	chokeberries	Plantae	Magnoliopsida	Rosales	Rosaceae
	X	X	X	X	*Crataegus*	hawthorns	Plantae	Magnoliopsida	Rosales	Rosaceae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
	X				*Malus domestica*	apple	Plantae	Magnoliopsida	Rosales	Rosaceae
	X			X	*Sorbus*	Rowans and Mountain Ashes	Plantae	Magnoliopsida	Rosales	Rosaceae
		X			*Spiraea alba*	white meadowsweet	Plantae	Magnoliopsida	Rosales	Rosaceae
		X		X	*Spiraea tomentosa*	Steeplebush	Plantae	Magnoliopsida	Rosales	Rosaceae
	X				*Spiraea*	meadowsweet	Plantae	Magnoliopsida	Rosales	Rosaceae
				X	*Fragaria virginiana*	Virginia strawberry	Plantae	Magnoliopsida	Rosales	Rosaceae
			X		*Potentilla canadensis*	dwarf cinquefoil	Plantae	Magnoliopsida	Rosales	Rosaceae
		X		X	*Potentilla simplex*	common cinquefoil	Plantae	Magnoliopsida	Rosales	Rosaceae
X		X	X		*Rosa multiflora*	multiflora rose	Plantae	Magnoliopsida	Rosales	Rosaceae
				X	*Rubus flagellaris*	Common Dewberry	Plantae	Magnoliopsida	Rosales	Rosaceae
		X			*Rubus hispidus*	swamp dewberry	Plantae	Magnoliopsida	Rosales	Rosaceae
				X	*Rubus idaeus*	red raspberry	Plantae	Magnoliopsida	Rosales	Rosaceae
		X			*Rubus occidentalis*	black raspberry	Plantae	Magnoliopsida	Rosales	Rosaceae
		X			*Rubus pubescens*	dwarf raspberry	Plantae	Magnoliopsida	Rosales	Rosaceae
	X	X		X	*Rubus*	brambles	Plantae	Magnoliopsida	Rosales	Rosaceae
	X	X			*Ulmus americana*	American elm	Plantae	Magnoliopsida	Rosales	Ulmaceae
X	X			X	*Boehmeria cylindrica*	false nettle	Plantae	Magnoliopsida	Rosales	Urticaceae
				X	*Boehmeria*	false nettles and allies	Plantae	Magnoliopsida	Rosales	Urticaceae
				X	*Pilea pumila*	Canada clearweed	Plantae	Magnoliopsida	Rosales	Urticaceae
			X		*Comandra umbellata*	bastard toadflax	Plantae	Magnoliopsida	Santalales	Santalaceae
		X			*Rhus glabra*	smooth sumac	Plantae	Magnoliopsida	Sapindales	Anacardiaceae
X	X	X		X	*Toxicodendron radicans*	eastern poison ivy	Plantae	Magnoliopsida	Sapindales	Anacardiaceae
				X	*Toxicodendron vernix*	poison sumac	Plantae	Magnoliopsida	Sapindales	Anacardiaceae
		X			*Acer pensylvanicum*	striped maple	Plantae	Magnoliopsida	Sapindales	Sapindaceae
				X	*Acer platanoides*	Norway maple	Plantae	Magnoliopsida	Sapindales	Sapindaceae
		X	X	X	*Acer rubrum*	red maple	Plantae	Magnoliopsida	Sapindales	Sapindaceae
X		X			*Acer saccharum*	sugar maple	Plantae	Magnoliopsida	Sapindales	Sapindaceae
	X				*Ribes americanum*	American Black Currant	Plantae	Magnoliopsida	Saxifragales	Grossulariaceae
				X	*Ribes cynosbati*	prickly gooseberry	Plantae	Magnoliopsida	Saxifragales	Grossulariaceae
	X				*Ribes rubrum*	Red Currant	Plantae	Magnoliopsida	Saxifragales	Grossulariaceae
X		X	X	X	*Hamamelis virginiana*	common witch-hazel	Plantae	Magnoliopsida	Saxifragales	Hamamelidaceae
X				X	*Chrysosplenium americanum*	American golden saxifrage	Plantae	Magnoliopsida	Saxifragales	Saxifragaceae
		X			*Micranthes pensylvanica*	Swamp Saxifrage	Plantae	Magnoliopsida	Saxifragales	Saxifragaceae
		X	X		*Micranthes virginiensis*	Virginia saxifrage	Plantae	Magnoliopsida	Saxifragales	Saxifragaceae
X	X	X	X		*Parthenocissus quinquefolia*	Virginia creeper	Plantae	Magnoliopsida	Vitales	Vitaceae
X				X	*Vitis*	grapevines	Plantae	Magnoliopsida	Vitales	Vitaceae
		X			*Huperzia lucidula*	shining firmoss	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae
	X				*Dendrolycopodium dendroideum*	prickly tree-clubmoss	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae
	X			X	*Dendrolycopodium hickeyi*	Hickey's tree-clubmoss	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae
X		X	X	X	*Dendrolycopodium obscurum*	flat-branched tree-clubmoss	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae
				X	*Dendrolycopodium*	tree-clubmosses	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae
X		X		X	*Diphasiastrum digitatum*	fan clubmoss	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae
X					*Lycopodium clavatum*	stag's-horn clubmoss	Plantae	Lycopodiopsida	Lycopodiales	Lycopodiaceae

AW	CF	CPGL	DL	FP	Scientific Name	Common Name	Iconic Taxon	Taxonomic Class	Taxonomic Order	Taxonomic Family
X	X	X	X		*Juniperus communis*	common juniper	Plantae	Pinopsida	Pinales	Cupressaceae
	X		X		*Juniperus virginiana*	eastern redcedar	Plantae	Pinopsida	Pinales	Cupressaceae
X					*Thuja occidentalis*	northern whitecedar	Plantae	Pinopsida	Pinales	Cupressaceae
X					*Abies balsamea*	balsam fir	Plantae	Pinopsida	Pinales	Pinaceae
		X	X	X	*Tsuga canadensis*	eastern hemlock	Plantae	Pinopsida	Pinales	Pinaceae
			X		*Pinus rigida*	pitch pine	Plantae	Pinopsida	Pinales	Pinaceae
	X	X	X	X	*Pinus strobus*	eastern white pine	Plantae	Pinopsida	Pinales	Pinaceae
	X				*Taxus canadensis*	Canada yew	Plantae	Pinopsida	Pinales	Taxaceae
				X	*Taxus*	yews	Plantae	Pinopsida	Pinales	Taxaceae
		X			*Equisetum*	horsetails	Plantae	Polypodiopsida	Equisetales	Equisetaceae
	X	X			*Osmunda claytoniana*	interrupted fern	Plantae	Polypodiopsida	Osmundales	Osmundaceae
X	X	X		X	*Osmunda spectabilis*	American Royal Fern	Plantae	Polypodiopsida	Osmundales	Osmundaceae
				X	*Osmundastrum cinnamomeum*	cinnamon fern	Plantae	Polypodiopsida	Osmundales	Osmundaceae
	X			X	*Osmundastrum*	Cinnamon ferns	Plantae	Polypodiopsida	Osmundales	Osmundaceae
	X	X			*Athyrium angustum*	northern lady fern	Plantae	Polypodiopsida	Polypodiales	Athyriaceae
X	X	X		X	*Onoclea sensibilis*	sensitive fern	Plantae	Polypodiopsida	Polypodiales	Onocleaceae
				X	*Amauropelta noveboracensis*	New York fern	Plantae	Polypodiopsida	Polypodiales	Thelypteridaceae
				X	*Dennstaedtia punctilobula*	hay-scented fern	Plantae	Polypodiopsida	Polypodiales	Dennstaedtiaceae
X		X		X	*Pteridium aquilinum*	common bracken	Plantae	Polypodiopsida	Polypodiales	Dennstaedtiaceae
X					*Pteridium aquilinum latiusculum*	eagle fern	Plantae	Polypodiopsida	Polypodiales	Dennstaedtiaceae
X	X			X	*Dryopteris carthusiana*	spinulose wood fern	Plantae	Polypodiopsida	Polypodiales	Dryopteridaceae
X				X	*Dryopteris cristata*	crested wood fern	Plantae	Polypodiopsida	Polypodiales	Dryopteridaceae
	X			X	*Dryopteris intermedia*	intermediate wood fern	Plantae	Polypodiopsida	Polypodiales	Dryopteridaceae
		X	X	X	*Dryopteris marginalis*	marginal wood fern	Plantae	Polypodiopsida	Polypodiales	Dryopteridaceae
	X	X		X	*Polystichum acrostichoides*	Christmas fern	Plantae	Polypodiopsida	Polypodiales	Dryopteridaceae
X		X	X	X	*Polypodium virginianum*	rock polypody	Plantae	Polypodiopsida	Polypodiales	Polypodiaceae
		X	X		*Polypodium*	polypody ferns	Plantae	Polypodiopsida	Polypodiales	Polypodiaceae
		X			*Adiantum pedatum*	northern maidenhair fern	Plantae	Polypodiopsida	Polypodiales	Pteridaceae
	X	X		X	*Ceratiomyxa fruticulosa*	Honeycomb Coral Slime Mold	Protozoa	Ceratiomyxomycetes	Ceratiomyxales	Ceratiomyxaceae
				X	*Fuligo*		Protozoa	Myxomycetes	Physarales	Physaraceae
				X	*Leocarpus fragilis*	insect-egg slime	Protozoa	Myxomycetes	Physarales	Physaraceae
	X				*Stemonitis splendens*	chocolate tube slime	Protozoa	Myxomycetes	Stemonitidales	Stemonitidaceae
				X	*Lycogala epidendrum*	Wolf's Milk	Protozoa	Myxomycetes	Reticulariales	Reticulariaceae
				X	*Tubifera*		Protozoa	Myxomycetes	Reticulariales	Reticulariaceae
	X				*Arcyria cinerea*	White Carnival Candy Slime Mold	Protozoa	Myxomycetes	Trichiales	Arcyriaceae

Appendix II. Potentially-occurring species of greatest conservation need in Windham (Wildlife Action Plan, 2020).

Status key: SGCN (Species of Greatest Conservation Need), SC (Species of Special Concern), ST (State-Threatened), SE (State-Endangered), FT (Federally-Threatened), FE (Federally Endangered).

Common Name	Scientific Name	Status	Wildlife Action Plan Habitat Types
American Black Duck	*Anas rubripes*	SGCN	Lakes and Ponds, Rivers and Streams, Marsh and Shrub Wetlands, Northern Swamps, Peatlands, Temperate Swamps
American Bumble Bee	*Bombus pensylvanicus*	SGCN	Developed Habitats, Grasslands, Shrublands
American Eel	*Anguilla rostrata*	SC, SGCN	Coldwater Rivers and Streams, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams
American Kestrel	*Falco sparverius*	SC, SGCN	Developed Habitats, Grasslands, Shrublands
American Water Shrew (Eastern)	*Sorex palustris albibarbis*	SGCN	Northern Swamps
American Woodcock	*Scolopax minor*	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Northern Swamps, Shrublands, Temperate Swamps
Bald Eagle	*Haliaeetus leucocephalus*	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lakes and Ponds, Rivers and Streams, Lowland Spruce-Fir Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest
Banded Sunfish	*Enneacanthus obesus*	SC, SGCN	Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Bank Swallow	*Riparia riparia*	SC, SGCN	Coldwater Rivers and Streams, Grasslands, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Marsh and Shrub Wetlands, Warmwater Rivers and Streams
Big Brown Bat	*Eptesicus fuscus*	SC, SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Black-billed Cuckoo	*Coccyzus erythropthalmus*	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Pine Barrens, Shrublands
Blanding's Turtle	*Emydoidea blandingii*	SE, SGCN	Floodplain Habitats, Marsh and Shrub Wetlands, Peatlands, Temperate Swamps, Vernal Pools

Common Name	Scientific Name	Status	Wildlife Action Plan Habitat Types
Blue-Spotted/ Jefferson Salamander	*Ambystoma pop. 3*	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest, Northern Swamps, Peatlands, Temperate Swamps, Vernal Pools
Blue-winged Warbler	*Vermivora cyanoptera*	SC, SGCN	Pine Barrens, Shrublands
Bobolink	*Dolichonyx oryzivorus*	SGCN	Grasslands
Brook Floater	*Alasmidonta varicosa*	SE, SGCN	Large Warmwater Rivers, Warmwater Rivers and Streams
Brown Thrasher	*Toxostoma rufum*	SGCN	Pine Barrens, Shrublands
Canada Warbler	*Cardellina canadensis*	SGCN	Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Chimney Swift	*Chaetura pelagica*	SGCN	Appalachian Oak-Pine Forest, Developed Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest
Common Loon	*Gavia immer*	ST, SGCN	Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Creeper	*Strophitus undulatus*	SGCN	Coldwater Rivers and Streams, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Eastern Box Turtle	*Terrapene carolina*	SE, SGCN	Appalachian Oak-Pine Forest, Grasslands, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Shrublands, Temperate Swamps
Eastern Brook Trout	*Salvelinus fontinalis*	SGCN	Coldwater Rivers and Streams, Lakes and Ponds with Coldwater Habitats
Eastern Hognose Snake	*Heterodon platirhinos*	SE, SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Pine Barrens, Shrublands, Vernal Pools
Eastern Meadowlark	*Sturnella magna*	ST, SGCN	Grasslands
Eastern Pearlshell	*Margaritifera margaritifera*	SGCN	Coldwater Rivers and Streams
Eastern Pond Mussel	*Ligumia nasuta*	ST, SGCN	Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Eastern Red Bat	*Lasiurus borealis*	SC, SCGN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Eastern Ribbon Snake	*Thamnophis sauritus*	SGCN	Floodplain Habitats, Marsh and Shrub Wetlands, Peatlands, Vernal Pools

Common Name	Scientific Name	Status	Wildlife Action Plan Habitat Types
Eastern Towhee	*Pipilo erythrophthalmus*	SGCN	Appalachian Oak-Pine Forest, Peatlands, Pine Barrens, Rocky Ridge, Cliff, and Talus, Rocky Ridge, Cliff, and Talus, Shrublands
Field Sparrow	*Spizella pusilla*	SGCN	Pine Barrens, Shrublands
Fowler's Toad	*Anaxyrus fowleri*	ST, SGCN	Appalachian Oak-Pine Forest, Dunes, Large Warmwater Rivers, Marsh and Shrub Wetlands, Pine Barrens, Shrublands, Vernal Pools, Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Golden Eagle	*Aquila chrysaetos*	SE, SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Rocky Ridge, Cliff, and Talus
Hoary Bat	*Lasiurus cinereus*	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Little Brown Myotis	*Myotis lucifugus*	SE, SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Pine Barrens, Temperate Swamps
Monarch Butterfly	*Danaus plexippus*	SC	Developed Habitats, Grasslands
Moose	*Alces alces*	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest, Swamps, Shrublands, Lakes and Ponds
Northern Black Racer	*Coluber constrictor constrictor*	ST, SGCN	Appalachian Oak-Pine Forest, Grasslands, Hemlock Hardwood Pine Forest, Rocky Ridge, Cliff, and Talus, Shrublands
Northern Goshawk	*Accipiter gentilis*	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest
Northern Leopard Frog	*Lithobates pipiens*	SC, SGCN	Coldwater Rivers and Streams, Floodplain Habitats, Grasslands, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Marsh and Shrub Wetlands, Shrublands, Warmwater Rivers and Streams
Northern Long-eared Bat	*Myotis septentrionalis*	FE, SE, SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest
Prairie Warbler	*Setophaga discolor*	SGCN	Pine Barrens, Shrublands
Purple Finch	*Haemorhous purpureus*	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps

Common Name	Scientific Name	Status	Wildlife Action Plan Habitat Types
Redfin Pickerel	*Esox americanus americanus*	SC, SGCN	Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Ruffed Grouse	*Bonsai umbrellas*	SGCN	Appalachian Oak-Pine Forest, Grasslands, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest, Shrublands
Rusty-patched Bumble Bee	*Bombus affinis*	FE, SE, SGCN	Developed Habitats, Grasslands
Scarlet Tanager	*Piranga olivacea*	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest
Silver-haired Bat	*Lasionycteris noctivagans*	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Smooth Green Snake	*Opheodrys vernalis*	SC, SGCN	Grasslands, Marsh and Shrub Wetlands, Peatlands, Rocky Ridge, Cliff, and Talus, Rocky Ridge, Cliff, and Talus, Shrublands
Southern Bog Lemming	*Synaptomys cooperi*	SGCN	Northern Hardwood-Conifer Forest
Spotted Turtle	*Clemmys guttata*	ST, SGCN	Floodplain Habitats, Marsh and Shrub Wetlands, Peatlands, Temperate Swamps, Vernal Pools
Triangle Floater	*Alasmidonta undulata*	SGCN	Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams
Tricolored Bat	*Perimyotis subflavus*	SE, SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Veery	*Catharus fuscescens*	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps
Wood Thrush	*Hylocichla mustelina*	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest
Wood Turtle	*Glyptemys insculpta*	SC, SGCN	Coldwater Rivers and Streams, Floodplain Habitats, Grasslands, Shrublands, Warmwater Rivers and Streams
Yellow-banded Bumble Bee	*Bombus terricola*	SGCN	Developed Habitats, Grasslands, Shrublands
Yellow Bumble Bee	*Bombus fervidus*	SGCN	Developed Habitats, Grasslands

Appendix III. Habitat block size requirements for 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 rodents	small rodents	small rodents	small rodents	small rodents
	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