

**NATURAL RESOURCE INVENTORY**  
**of the**  
**SMITH-SARGENT ROAD PROPERTY**  
**Holderness, NH**

**FINAL REPORT**



[Smith-Sargent Property Upper Marsh as seen from south boundary]

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**Submitted to:**

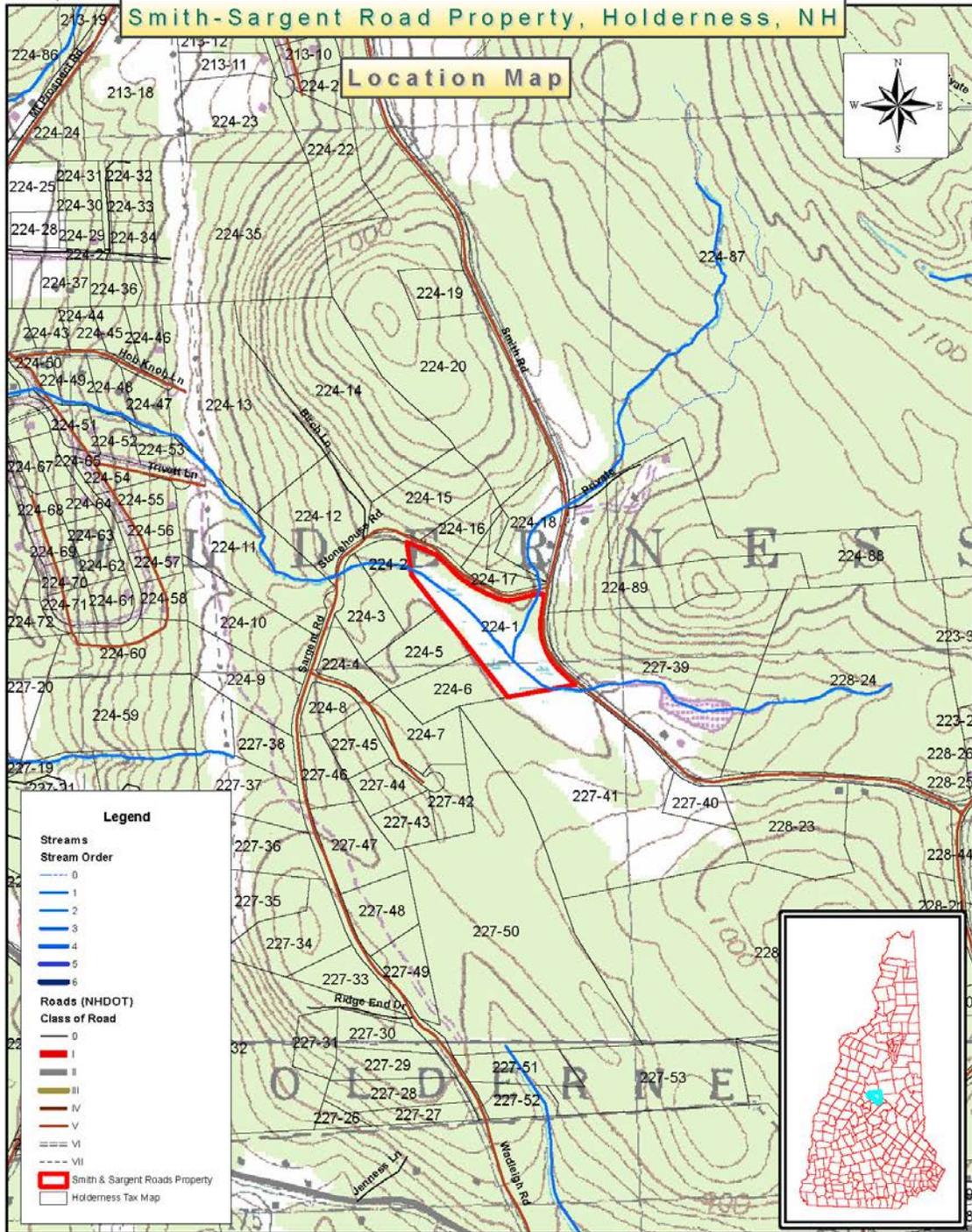
**Holderness Conservation Commission**

**June 30, 2016**

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# Smith-Sargent Road Property, Holderness, NH

## Location Map



**Legend**

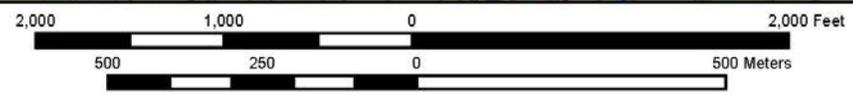
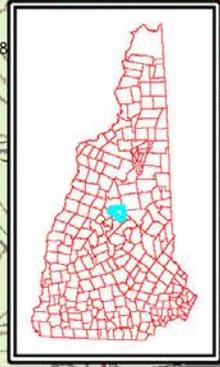
**Streams**  
Stream Order

- 0
- 1
- 2
- 3
- 4
- 5
- 6

**Roads (NHDOT)**  
Class of Road

- 0
- I
- II
- III
- IV
- V
- VI
- VII

Smith & Sargent Roads Property  
Holderness Tax Map



VdP/EMC June 2016

## **SUMMARY**

Between October 2015 and June 2016 a comprehensive natural resources inventory (NRI) was completed by Ecosystem Management Consultants (EMC) of Sandwich, NH on the 8.5-acre town conservation land at the corner of Sargent Road and Smith Road in Holderness, NH. Managed by the Holderness Conservation Commission (HCC), this parcel was obtained largely for the complex wetland system that occupies more than 65% of the parcel. The purpose of the NRI was to inform the town about the qualities of the natural resources on the lot, as well as to determine whether or not the site would be suitable for limited environmental education for the general public.

Three site visits were conducted at the Sargent-Smith Road Property for the purpose of gathering NRI data. A fourth visit was also made on November 15, 2015 for the purpose of educating the HCC and other town officials about the extent and functional value of the wetlands on the parcel. The first field visit in October provided an initial review of the location of the parcel, the boundary of the wetland, and the plant and animal resources present. A second site visit in January was held for the purpose of tracking mammals during good snow cover. The third and final field NRI visit was recently held in June, and accomplished the task of surveying typical growing season flora and fauna, as well as determining the quantity and quality of the water resources. During all field site visits, natural resource data was recorded using a hand-held Garmin GPS unit and a Canon digital zoom camera.

The general condition of the site was very good to excellent relative to its land use history. The roadside forests had been largely left during the latest timbering operation in the late 1950's – 1960's. No structures were found on the site, and very few areas of soil disturbance were found. Two perennial streams enter the lot, one from the north and one from the southeast, both of which appeared to be of high quality. The unnamed, second order stream that has been dammed by beavers in the past, runs the length of the property from southeast to northwest and exits under Sargent Road just west of the parcel boundary. This stream flows westerly and descends to the Pemigewasset River less than two miles away.

A total of 5.6 acres of wetland was identified on the property, most of which is comprised of old beaver pond and marsh. Beavers have been trapped out of this system for many years, and both dams were found to be ditched and lowered. This has reduced the floodwater storage capacity of the wetland, yet has provided good habitat for facultative wetland wildlife species. The wetland complex is hydrologically connected to one of Holderness' prime wetland immediately upstream and acts as a continuation of this 14-acre complex. The wetland complex is very high functioning in spite of the beaver removal, and provides the context for most of the 12 cover types and 448 flora and fauna species identified during the survey. Although no rare or endangered species were discovered, several of the wildlife and plant species are regionally uncommon and indicate positive habitat conditions for their occurrence.

The site has great educational potential, although very few good upland soil areas that could serve as parking for trail development. Two existing sites that have already been filled could be cleared and used for limited parking, although walking trails will require wetland permitting for a boardwalk if most of the site is to be utilized for education.

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Snowshoe hare tracks along wetland edge

## I. Introduction

The Town of Holderness obtained an 8.5-acre parcel at the corner of Smith Road and Sargent Road in 2015. The Conservation Commission, acting on behalf of the town, agreed to take over the management and stewardship of this property. The first order of business was to determine what this undeveloped property contained, as well as to determine if it was suitable for use by the general public. After an RFP process over the summer, Ecosystem Management Consultants was awarded a grant to conduct a comprehensive natural resources inventory or NRI, on the property. This work effort began in the fall of 2015 and continued into the spring of 2016. Although it primarily involved fieldwork that surveyed the entire property, it also included an instructional workshop on wetlands that was offered by EMC to members of the Holderness Conservation Commission and other municipal officials. The following report summarizes the findings of the NRI, and gives details on the bedrock, soils, water resources, plant communities, wildlife species and habitats on the parcel. The narrative report is augmented by a series of maps and species lists in the Appendix.



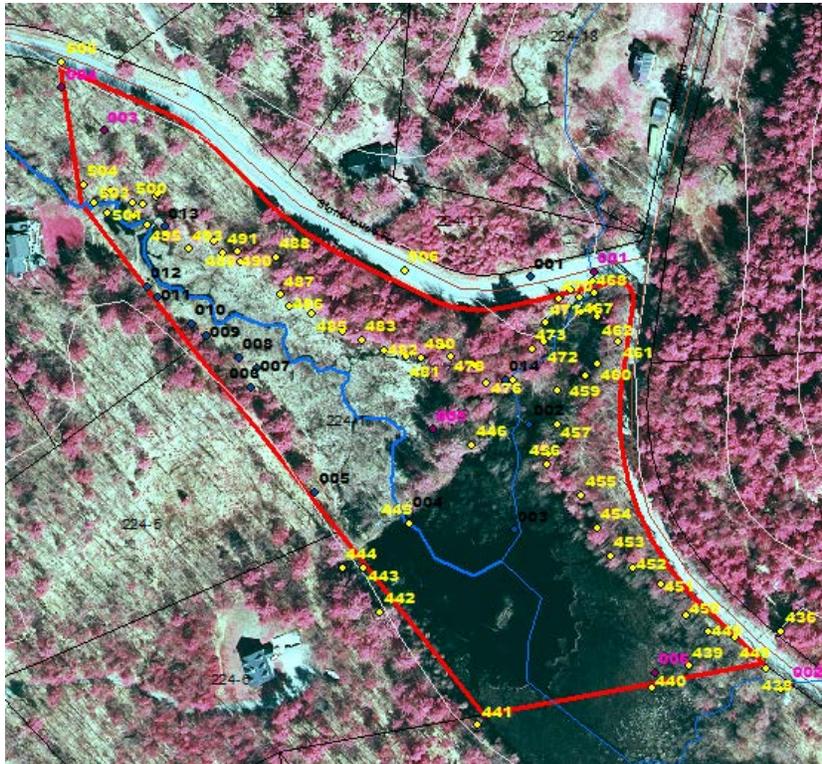
Photo by Larry Spencer  
Above: wetland training workshop for HCC in November

## II. Methods

Very little parcel specific information was available about the Smith-Sargent Road property. There was no survey or deed that was offered, and therefore the town tax map was relied upon for estimating its location and boundary configuration. This was provided in both paper and digital form by the town clerk’s office. All available GIS data layers were reviewed in advance of the first site visit in October. These included the following:

<u>Resource Layer</u>	<u>Date</u>	<u>Description</u>
Bedrock Geology	1997	NH GRANIT (Lyons et al.)
Digital Elevation Models	1987	From USGS topographic sources
Digital Orthophoto Quads (DOQ)	1998	Historical aerial photo data
Digital Raster Graphics (DRG)	1987	USGS topographic maps
Landsat land use coverage	2001	Latest satellite imagery of cover types
NAIP aerial photography	2003,9	Statewide coverage of leaf-on condition
National Wetlands Inventory (NWI)	1987	USFWS Wetlands Inventory Data
NH Hydrography Dataset	2010	Streams & rivers, and other surface waters
NH Wildlife Action Plan (WAP)	2015	Wildlife habitat & condition ranking
Parcel Map for Holderness	2010	Town of Holderness
Political boundaries	1996	UNH CSRC
Public Roads	2010	NH DOT
Railroads	1993	UNH CSRC
Soil units, especially hydric	2005	NRCS (also available through Web Soil Survey)
Tagged Vector Contours (TVC)	1998	40-foot contour intervals (DEM)
USGS Color infra-red photography	2010	Published: Jan 2011, 1-foot pixel
Watershed boundaries	2002	UNH CSRC

Of particular use was the 2010 color infrared aerial orthophotographs, which provided a 1-foot pixel image of the condition of the land five years earlier. This resulted in the recognition that beavers had inundated the site in the recent past, and that their absence has been largely due to human interference. The aerial photos also provided a good estimation of the canopy cover types, which supported the initial designation of natural communities and wetland extent. The latter was configured on the basis of the infrared band layer, which showed the approximate extent of 'cool' (i.e. moist) soils versus warm (i.e. dry) soils. This also helped in the in the initial mapping of wetland cover types according to the National Wetlands Inventory (NWI) standard, the Cowardin Classification System (Cowardin et al. 1979).



Left: 2010 color infrared image of the Smith-Sargent property showing waypoints generated during the field surveys

Field site visits took place on October 15 and November 15, 2015, and January 7 and June 26, 2016. During all but the November site visit a hand-held Garmin 12XL GPS unit and Canon Powershot SX20IS digital camera was used to record field data. Since the November site visit was for the purpose of instruction about wetlands, soil spades and augers replaced the GPS unit and camera. The purpose October site visit was to check the initial wetland map, identify and revise the mapped wetland cover types, and to locate the property on the ground. Upland cover types and natural communities were also surveyed.<sup>1</sup> The purpose of the January site visit was to conduct snow tracking of mammalian visitors through the use of a meander transect and a track-intercept approach (Thompson 1988). Water table fluctuations in winter were also checked during that time. The purpose of the final visit in June was to survey the property during the growing season and generate species lists for all of the flora and fauna that are more active during that time of year.

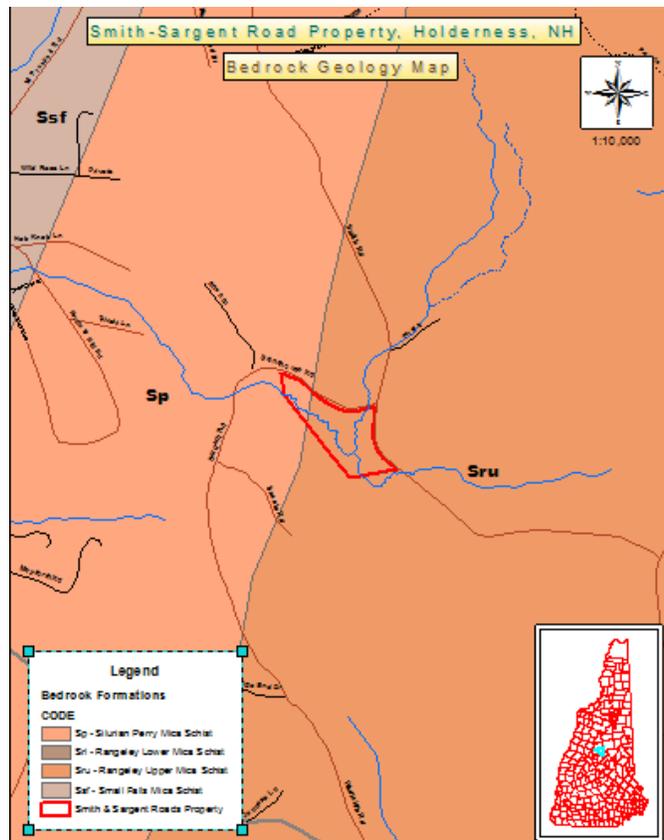
<sup>1</sup> "Natural communities" are those aggregations of plants, animals, and other organisms in their physical environment that tend to replicate themselves across the landscape (Nichols 2004).

Field data was processed by uploading the GPS data using DNR-GPS and ArcGIS 10.x. Waypoints were corrected to within their given range of precision based on visible features on the aerial photograph. Wetland extent and cover type lines were edited in ArcGIS and represented on maps using various layouts. Stream alignments that were downloaded from the National Hydrography Dataset (NHD) were corrected according to the 2010 aerial alignment. Property boundaries were corrected according to the very limited field evidence, and wildlife feature data were added based on GPS and aerial photo data. All digital photographs were processed using the Canon ZommBrowser EX module and adjusted by cropping and correcting for contrast and white balance. Any collections that were made of plants were identified using identification manuals listed in the References as well as salient web sites as noted below.

### III. Results / Discussion of Findings

#### A. Bedrock and Soils

The 1997 *Bedrock Geology of New Hampshire* (Lyons et al.) shows two bedrock formations for the area covered by the Smith-Sargent property. Both date back to over 440 MYA during the Silurian Age. Both are mica schists that formed in shallow seas off the coast of the (then) Atlantic Ocean that got compressed and altered metamorphically during the Acadian orogeny (mountain-building) event of the late Devonian Age (+/- 360 – 385 MYA). The Silurian Perry Formation (denoted as 'Sp') that underlies the western part of the property is comprised of fined-grained pelitic schist with abundant quartzite and mica. The Silurian Rangeley Formation that underlies the eastern half of the property (denoted as 'Sr') is comprised of medium to coarse-grained pelitic schist with scattered cotecules of calcilicate or 'pods.' Both formations are very similar in that they weather to an iron-rich, low pH mineral substrate through frost cleaving and physical erosion.



The largest weathering event over the past 100,000 years has been the Wisconsin period of glaciation. The massive ice sheet that covered the northern half of North America was over 1.5 miles thick in most locales in New England. This event lasted over the course of over 20,000 years and brought about vast changes in the surface topography of the region. Over 20 feet of surface material or 'overburden' was removed and in some cases replaced by the slow movement of over 350 metric tons of vertical pressure per square meter. At the Smith-Sargent property, at least two major glacial events took place. First, the land was scoured, particularly along the small fault line that exists between the two bedrock types, as was evidenced by the drainageway that feeds the wetland from the north. This included the removal of

tens of feet of overburden and the displacement of that material to the south. Second, during the downwasting event at the end of the glacial period, the melting ice temporarily dammed up the outflow stream and allowed for ponding to occur over most of the property. The latter was evident when soil test pits were dug during the November site visit and very fine silts were discovered that indicated a glacio-lacustrine environment.

The deposition of pond water silts was then covered up by a thin mantle of glacial till, which otherwise covered all of the upland portions of the site. This glacial till contains common stones and small boulders in a loose assortment of fairly coarse fragments. This sandy to stony base formed the parent material for the glacial till soils in the uplands. In the wetland areas, the very fine silts provided an impervious layer above which the water table became “perched” during the wettest times of the year. In spite of the fairly coarse sands and loams that were dumped by the glacier across the edge of the wetland, this zone of “fines” has extended the wetland edge outward from the central drainageway. This, of course, has been exacerbated by beavers, which in the past have dammed up the central drainageway and caused flooding of the former glacial basin.

### Soils

As a result of the above actions, soil types on the Smith-Sargent Lot vary from sandy, glacial tills in the uplands, to moderately well-drained tills near the edge of the wetland, to deep organic muck in the



**Above: soils are generally hydric glacial tills with little to no slope except along the roadsides**

beaver-impounded areas. The Becket series soil best fits the field-determined morphology of the upland glacial tills. Immediately downslope are thin tills that overlie a somewhat impervious layer that correlates well with then Sunapee series soil. Poorly drained soils near the edge of the wetland have water tables that saturate to the surface for more than a week or two during the growing season, and therefore match the Pillsbury series soil. Finally, in the very poorly drained areas are Meadowsedge soil that are true *histosols* in the sense that they have more than 16 inches of organic material at the surface. Based on scattered soil auger evidence, some of these mucky-peat organic soils are over three feet in depth.

Since most of the site is wetland, it is generally rated fair to poor for growing trees or crops. Both the surface stoniness and water saturation are two limiting factors for plant growth. Slope is generally not an issue since most of the site have grades that are less than 8%. Other than some steep roadside banks, the slopes will not prevent any type of development or construction activity as potentially desired by the town for educational purposes. In some areas, there may be surface stones or boulders that will have to be moved. Although these factors limit development, the soils at the site are generally rated good to excellent for wetland wildlife. They also support wetland plant communities that are currently responding to periodic inundation from flooding from the two perennial inflow streams on the site.

## B. Water Resources & Wetlands

As noted above, the topography of the Smith-Sargent Road Property is fairly flat, with a central drainageway that runs southeast to northwest. Two, first order, perennial streams join together in the south central part of the property. The slightly larger stream rises to the north and east on the slopes of Mount Prospect and enters the property under Sargent Road near the corner with Smith Road. This stream passes through a fairly large (30") culvert that is slightly perched at its outflow. It flows across an old stream delta that has had several different channels over the past few centuries. The latest channel bends strongly west and then south as it enters the open marsh. It passes by a very old (150 years +) beaver lodge as it leaves the woods, which indicates that the site was likely ponded at one time. The second stream rises to the south and east near Smith Road, and flows northwesterly through the prime wetland on the east side of Smith Road just above the Smith-Sargent Property. Another suitably sized culvert allows for uninterrupted passage of this stream into the property, this time without any perching whatsoever. Based on the tax map, this culvert represents the approximate southeast corner of the property, although no evidence of a boundary corner was found.



Left: The inflow stream along Smith Rd near SE corner; Right: the perched culvert in the NE corner along Sargent Road

Both of these perennial streams join in the south central part of the parcel. This was the former location of a fairly large (.4-acre) beaver pond that is now a medium-depth sedge meadow. From here, this now second-order stream flows northwesterly through the property and exits westerly across Sargent Road. In less than two miles this stream flows into an old excavation site near the Pemigewasset River. Based on the watershed size of the two primary tributaries, this second stream has a variable discharge rate of between 2 – 10 cfs as it leaves the property.

The most salient surface water feature on the Smith-Sargent Property is the wetland complex that extends from the southern edge to the northwestern corner. The 5.6 acres of wetland on the parcel is part of a 14 acre complex that includes the hydrologically connected prime wetland that lies upstream and east of Smith Road. This wetland also extends further south on the west side of the road and ends at the outflow point on Sargent Road.<sup>2</sup> Over 50% of this wetland has very poorly drained soils with deep muck and peat. This indicates a high degree of previous inundation, likely from beaver activity for the past several thousand years. In spite of the current absence of beaver, there are pockets of inundation

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<sup>2</sup> The wetland extent determination conforms to the guidance described in the NH Method (see [www.nhmethod.org](http://www.nhmethod.org)).

that support submerged and floating-leaved aquatic plants. The two areas where this occurs is immediately upstream of the two dewatered dams in the central and northern parts of the property. Less than .2 acres of open water currently exists outside of the stream channel as it threads its way through the marshland.

**Right: A small amount of pooled water still exists behind the two dewatered beaver dams; this aquatic bed is just above the lowest dam in the northwest part of the property**



The most predominant cover type of the wetland complex at Smith and Sargent Roads is marsh, with deepwater marsh near the open water areas, next to medium-depth sedge meadow marsh, tall graminoid marsh, and finally tall graminoid-scrub shrub marsh as one approaches the upland areas. Only a thin band of scrub-shrub and forest swamp borders the open marsh areas, although this cover type is more predominant in the overall wetland complex off the property. The open marsh provides extensive vistas across the property, as well as a dramatic backdrop to the roadside forest as one travels along Smith Road. The marsh helps regulate flood flow, provides some groundwater discharge and recharge to the area, it helps detoxify nutrients (i.e. road salt) that enter the basin, and traps any road and stream sediment that washes in.

This wetland is the largest basin marsh above the Pemigewasset River on this drainage. Along with the aforementioned prime wetland upstream, it provides the best filtering capacity for water quality remediation in the area. In fact, given its direct connection to the prime wetland, it is deserving of consideration for this type of protective status as well.

Groundwater supplies at the Smith-Sargent Road Property are limited. Given the very small watershed upslope of the parcel (roughly 350 acres), as well as the low slope and impervious soil base, groundwater discharge is limited to a few toe slope positions along the wetland edge and (possibly) a few sites within the basin itself. Seepage indicator plants are few, and most wetland edge positions contain firm substrates. Groundwater recharge is also limited owing to the subsurface materials, although some recharge is probable in the sandy upland areas adjacent to the wetland. The nearest mapped aquifer is about one-half mile away to the west.

### **C. Cover Types & Natural Communities**

The above discussion of the wetland complex offers a beginning description of the cover types that are present at the Smith-Sargent Road property. Most of these can be assigned to a specific natural community type, although a couple of them are not defined in the most recent publication on natural communities of New Hampshire, *The Nature of New Hampshire – Natural Communities of the Granite State* (Sperduto and Kimball 2011). The marsh and shrubland itself is comprised of six different natural communities:

- 1) Aquatic Bed – also known as a deepwater marsh, this permanently inundated type supports non-persistent rooted vascular plants like water-lilies, water-shield, and pickerelweed, along with submerged aquatic plants like bladderwort, pondweed, and watercress. It is an important habitat for migratory ducks, turtles, snakes, frogs, toads, salamanders, dragonflies and damselflies, and other aquatic macro-invertebrates.

- 2) Sedge Meadow Marsh – this seasonally flooded/saturated zone extends upgradient of the aquatic bed and is typically dominated by various sedge family members such as threeway sedge (*Dulichium*), spikesedge (*Eleocharis spp.*), sedge (*Carex spp.*), and bulmsedge (*Scirpus spp.*). It also supports plants such as swamp candles (*Lysimachia terrestris*), marsh St. Johnswort (*Triadenum virginicum*), and dwarf St. Johnswort (*Hypericum mutilum*). These sites are critical habitat for different species of nesting birds (e.g. American bittern), pickerel frog, dragonflies and damselflies, and other aerial aquatic insects such as marsh beetles, craneflies, and mosquitoes.



Sedge Meadow Marsh

- 3) Tall Graminoid Meadow Marsh – this natural community is less frequently inundated than the sedge meadow, yet still contains year-round saturation that promotes the development of deep organic soils. Bottle sedge (*Carex utriculata*) and bluejoint reedgrass (*Calamagrostis canadensis*) tend to be co-dominant, along with low-growing woody shrubs such as meadowsweet (*Spiraea alba var. latifolia*) and steeplebush (*Spiraea tomentosa*). Occurrences can either be extensive and uniform (as in the upper marsh at Smith-Sargent Road), or patchy and localized (as in the lower marsh). Common yellowthroat, marsh wren, and red-winged blackbird are associated with these sites, as are ribbon snake, southern bog lemming, meadow vole, moose and deer.



Tall Graminoid Meadow Marsh



Tall Graminoid Scrub-Shrub Marsh

- 4) Tall Graminoid Scrub-Shrub Marsh – the principal difference between this natural community and the last one is the addition of several new species of forbs and shrubs. Forbs that prefer to dry out even more during the growing season include late goldenrod (*Solidago gigantea*), flat-topped aster (*Doehlingeria umbellatus*), and tussock sedge (*Carex stricta*). Shrubs that commonly occur in these zones include northern arrowwood (*Viburnum dentatum*), winterberry holly (*Ilex verticillata*), and mountain holly (*Ilex mucronata*). These areas form critical habitat for a number of larger mammals such as deer, coyote, fox, snowshoe hare, raccoon, and bear. They are also important pollinator feeding sites for a variety of moths and butterflies.

- 5) Alder Alluvial Swamp – This shrub-dominated natural community bridges the gap between a marsh, where non-woody plants dominate, and a swamp, where woody plants dominate. These sites are along sufficiently large drainageways to support speckled alder (*Alnus incana ssp. rugosa*) as a dominant woody plant, but also retain ample diversity of forbs and graminoids such as jewelweed (*Impatiens capensis*), rough avens (*Geum laciniatum*), sensitive fern (*Onoclea sensibilis*), manna-grass (*Glyceria striata*), hairy willow-herb (*Epilobium ciliatum*), and fringed sedge (*Carex crinita*). Earthworms are common in these sites, as is the one shrub-inhabiting bird that feeds on them, American woodcock.

- 6) Alder-Dogwood-Arrowwood Alluvial Thicket – This community is found along stream drainageways where flooding is common. It is also shrub-dominated. Other species mix including those noted in the name, although meadowsweet, steplebush, and highbush blueberry (*Vaccinium corymbosum*) are fairly common as well. At Smith-Sargent, this type was only found along the western edge of the open marsh system where a number of game trails have been made by medium to large mammals.

Right: Alder-Dogwood-Arrowwood Alluvial Thicket



At least two forested wetland natural communities were noted on the property. The most common was the Seasonally Flooded Red Maple Swamp that was observed all along the southeastern edge.



Above: edge of Tall Graminoid Scrub-Shrub Marsh looking into Seasonally Flooded Red Maple Swamp

Most of this seasonally inundated community was actually found off-site to the south as well as to the west of the southern boundary. The canopy was dominated by red maple (*Acer rubrum*) and the understory by tussock sedge. These types of communities are not uncommon throughout the state where second and third order streams form narrow floodplains at bends and old eddies. These sites are favorite haunts for two rare turtles in New Hampshire, the wood turtle and spotted turtle, although neither have yet been detected on the property.

A second forested swamp known as the Hemlock-Cinnamon Fern Swamp/Forest was located just above the junction of the two perennial streams where glacio-lacustrine soils have created a semi-saturated substrate that has favored hemlock. Since these trees have shallow roots systems, they are apt to fall during high wind events and over time create 'pit-and-mound' topography. The confined area on the east side of the wetland between the upper and lower marsh systems harbors this community type. Wintering deer yards are frequent in these types of natural communities. The few sapling hemlocks that were found in this area showed the signs of repeated bark browsing by deer.

Two cover types were not assignable to a natural community owing to their variability and lack of consistent plant dominance features. The 'Perennial Stream' noted on the map included all channelized areas where the second order stream was visible. Aside from the obvious absence of much plant life, these cover types favor selected species of fauna, notably fish, such as eastern brook trout and blacknose dace, stream salamanders, such as two-lined and dusky salamanders, and aquatic macro-invertebrates, such as caddisflies, mayflies, and stoneflies.



Both the Perennial Stream and Riparian Forest Habitat were influenced by streams

The other unnamed cover type was denoted as ‘Riparian Forest’ owing to its occurrence along a perennial stream where plant species diversity is directly influenced by the stream during all times of the year. In many sites, such as the lower extent of the stream on the Smith-Sargent Property, the stream itself regularly overtops its banks and creates small floodplain channels. Unique plant and animal species can be found here, including rough sedge (*Carex scabrata*), golden saxifrage (*Chrysosplenium americanum*), and long beech fern (*Phegopteris connectilis*). These are favored sites for mink, raccoon, Louisiana waterthrush, veery, wood turtle, two-lined salamander, redback salamander, and certain ground beetles (*Carabidae*). With additional field time some of these species may yet be discovered in the two Riparian Forests identified for the property.

### Wildlife Habitat and Species

The above description of natural community types offers a brief overview of common wildlife species for the Smith-Sargent Property. Since the parcel mostly contains wetland, many of the species are wetland-dependent for a certain portion of their lives. Some, like white-tailed deer and coyote, are wide-ranging and utilize the Smith-Sargent Property for only part of their food, shelter, and reproductive needs. Others, like twelve-spotted skimmer or two-lined salamander live their entire lives on the property and never leave it (unless they happen to live at the edge). For the most part, the wildlife species observed on the property are reflective of the common species in the region. A few are less common and can be considered regionally rare. The species lists in the Appendix provide a list of each species group arranged in approximate phylogenetic order, except for plants, which are listed alphabetically. A summary of the total species observed is as follows:

<b>MAMMALS</b>	<b>22</b>
<b>BIRDS</b>	<b>52</b>
<b>AMPHIBIANS</b>	<b>9</b>
<b>REPTILES</b>	<b>3</b>
<b>FISH</b>	<b>2</b>
<b>INVERTEBRATES</b>	<b>71</b>
<b>FUNGI</b>	<b>24</b>
<b>SUM</b>	<b>183</b>

#### Mammals

The observation of mammal sign was made on the basis of tracks, scat, tunnels, scrapes, claw marks, dens, beds, browse, scent, and occasional sighting. While observations were generally recorded during every field site visit, the January field session purposefully recorded track intercepts along a meander transect of approximately 940 meters in length. This effort included a survey all cover types. A synopsis of mammal track frequency is provided in Appendix C. Snow conditions for tracking during that day were excellent: a 1 - 2 cm deep icy powder snow lay atop a 15 – 25 cm icy crust for a total of seven nights. The transect route ran from the southeast corner to the northwest corner roughly 25 m off of the roadway, and then returned through the central part of the property. (See the transect map in Appendix A-5).

A total of 290 track intercepts were recorded along the transect for an average of one intercept for every 22.7 meters of travel per night.<sup>3</sup> This figure is representative of regional averages as recorded by the author since 1985. Red squirrel was the most frequent track-maker with 169 track intercepts,



**Above: all three resident canines – coyote, red fox, and gray fox followed the same trail in the marsh**

followed by red fox and snowshoe hare at 25 each, gray fox (18), gray squirrel (13), coyote (12), and white-tailed deer (10). Other species of occurrence included ermine, flying squirrel, chipmunk, mink, and bobcat. The mixed and softwood-dominated mixed forests had the most track intercepts, followed by the hardwood forest and the scrub-shrub/forested swamp. Small mammals (i.e. smaller than chipmunk) were tallied separately, with a total of 278 intercepts among five species: red-backed vole (218), *Peromyscus* mouse (40), *Sorex* shrew (likely masked shrew, 15), short-tailed shrew (3), and meadow vole (2). The distribution of habitat preferences was similar to the larger mammals, with an additional preference for hardwood-dominated mixed forests.

Six other mammal species were recorded during the growing season, including black bear, raccoon, beaver, muskrat, river otter and striped skunk. Bear trails were found through the tall graminoid marsh, raccoon tracks were found along both inlet streams, beaver sign was found throughout the site, muskrat scat was found on a log in the lower beaver pond area, and skunk tracks were found in mud below the culvert at the beginning of Sargent Road. Additional evidence of the mammals who were recorded in winter was made as well, including fresh deer browse and beds, squirrel middens, chew marks and tunnels, small mammal tunnels, and the scent of red fox and short-tailed shrew.

There were a few species of mammals that were notably absent from the observation tally. Moose sign was missing, in spite of the area being suitable for the occurrence of the species.<sup>4</sup> The marsh system likely receives some visitation by moose from time to time, although the fairly recent downturn in the moose population (mostly from winter tick) has offset their occurrence throughout the region. Porcupine was missed, but understandably so since the property is small and has very few woodlands and no talus slopes or boulder piles that would otherwise attract them. Neither meadow nor woodland jumping mouse was observed, although suitable habitat exists on the property. These hibernating,



**The old beaver dam in the upper marsh appeared to be a locus for mammal activity, including the only set of bobcat tracks found on the property**

<sup>3</sup> Known as the 'track interval per night,' this figure can be used to ascertain approximate frequency of use on a site by site basis.

<sup>4</sup> Moose sightings were recorded, for example, on the Smith and Russell properties just east of Smith Road less than one half-mile away.

largely nocturnal species can be difficult to detect without live traps, and so would likely turn up with a suitable sampling effort. Long-tailed weasel was missed even though the riparian and marsh habitat is preferred by them. Their population numbers fluctuate from year to year, and track records from the past several decades seem to indicate sporadic occurrence. Similarly, fisher and pine marten are sporadic predators that likely use the property but were not recorded on account of the insufficiency of the sampling effort. Repeated track transects would likely yield records of these two mustelids, although the marten would be fairly rare as it prefers higher elevations and boreal habitats.

### Birds

The 52 species of birds that were observed represent about 85% of the average number of breeding birds for a given locale in the Lakes Region.<sup>5</sup> It also represents about 75% of the likely number of breeding species that the property could support based on the exceptional diversity of wetland habitats. The attached species list in Appendix B includes the 19 other probable breeding species, which includes a number of waterfowl and wading birds, a few residential passerines, and several neo-tropical migrants. The attached list also provides an approximate indication of the frequency of the birds that were recorded. These data were gathered by observing separate individuals in the different locales on the property.<sup>6</sup> For example, at least six different black-capped chickadee pairs, five different blue jay groups, four different myrtle warbler pairs, and three separate song sparrow nesting areas were observed. A total of 76 occurrences were recorded among the 52 species, resulting in an average of 8.9 occurrences per acre. Although each occurrence was not confirmed as a breeding one, this number reflects the fairly high density of breeding birds on the property, likely owing to the abundance of good breeding habitats.



The state bird of New Hampshire, purple finch, was recorded as a possible breeder on the parcel

The open marsh habitat was a favorite for common yellowthroat, song sparrow, red-winged blackbird, and possibly marsh wren (although this species was not recorded). The addition of shrubs along the edge and scattered throughout the lower marsh favored gray catbird, swamp sparrow, white-throated sparrow, and (likely) American woodcock. The open wetland juxtaposed near the forested canopy was exceptional habitat for ruffed grouse, mourning dove, least flycatcher, eastern kingbird, winter wren, cedar waxwing, chestnut-sided warbler, myrtle warbler, and American goldfinch. The closed canopy forest offered good habitat for eastern wood pewee, red-eyed vireo, white-breasted nuthatch, hermit thrush, blackburnian warbler, ovenbird, and purple finch.



Left: common yellowthroat was common on the property

<sup>5</sup> This figure is based on roughly 55 breeding bird counts in the Lakes Region by the author since 1988.

<sup>6</sup> In the case of wild turkey, the number "5" indicated the total number of individuals in a winter flock that was tracked in January.

Of the non-breeding birds that were recorded, the American kestrel was the most notable. This migrant was seen in the fall over the open wetland, where it could have been foraging for small birds, frogs, toads, or snakes on its way from its breeding ground farther north. This species prefers open upland habitat, which does not occur on the property. Similarly, the turkey vulture that was sighted overhead was a non-breeder, and may have been either an immature or non-breeding adult that was wandering through. The broad-winged hawk, however, was likely a breeding individual as it was seen during the growing season and was giving its alarm calls when observed. It is possible that it was breeding off the property as no suitable nest trees were seen within the Smith-Sargent parcel.

At least nine bird species were observed from aural records off of the property, including barred owl, pileated woodpecker, great crested flycatcher, red-breasted nuthatch, northern parula, black-throated blue warbler, black-throated green warbler, scarlet tanager, and northern cardinal. Of these species, all but the northern cardinal likely breed on occasion within the property, yet virtually all of them likely utilize the property for part of their normal feeding forays. In New England, the northern cardinal typically prefers open, brushy habitats in residential areas, several sites of which occur nearby. All of the other species breed in habitats that are contained within the Smith-Sargent property, and could have easily been recorded on the parcel proper. A more protracted effort in surveying the breeding birds and confirming their presence is warranted at some point in the future.

### Amphibians

Of the 14 common species of amphibians in the region, nine were recorded from the Smith-Sargent Property. These included all of the major groups – i.e. salamanders, chorus frogs, treefrogs, true frogs, and toads, and all three of the major amphibian habitat types, namely streams, ephemeral ponds and permanent ponds. Green frog was the most commonly encountered species. It was found throughout the parcel in all aquatic areas. Spring peeper was mostly heard rather than seen, and scattered locales during both the fall and summer yielded their characteristic ‘peep-peep’ call. Gray treefrog was also heard from at least two locales, one near the inflow stream at the road junction and one near the lower beaver pond. Wood frog was seen rather than heard. Just young individual was seen along the southerly inflow stream. Similarly, only one pickerel frog was seen. It was observed at the upper beaver meadow at the water’s edge. Eastern toad was recorded in the upper and lower marshes. Bullfrog was not observed, although should be present in one or both of the residual beaver ponds.



Just three of the six common regional salamander species were observed. Red-spotted newt was the most frequent with adults present in both of the beaver ponds and red eft juveniles scattered throughout the upland forest. Redback salamander was uncovered while searching the streamside cover objects for stream salamanders. They also turned up within the upland forest underneath old rotten logs. Spotted salamander was detected by virtue of two old egg masses that were found in the upper beaver pool. Larvae of this species was also noted in the pool near the egg masses. Also this species is normally associated with vernal pools, it is also not uncommon in other ephemeral water bodies such as

shallow beaver ponds, stream pools, and floodplain channels. The other three salamander species that are present in the region but went undetected included the two-lined salamander, the northern dusky salamander, and the spring salamander. All three are associated with streams, although the spring salamander also occurs in springs and seeps. The absence of sufficiently deep stream pools and abundant cover objects (e.g. stones and cobbles) was likely the reason they were not observed. Further searching should turn up at least the two-lined salamander, as this species is very common and was present upstream on the nearby Smith property.



Painted turtle was the only turtle sighted although snapping turtle tracks & trails were also recorded

### Reptiles

Just three species of reptiles were observed on the Smith-Sargent Property during the four field site visits. Such a low species diversity is not uncommon for such a small property with limited open upland habitat. A single garter snake was encountered at the edge of the wetland near the southeast corner of the property; one painted turtle was observed in the upper beaver pool in June; and tracks and matted sedges from a snapping turtle was also seen in this locale. Given the habitat present on the site, northern ribbon snake and northern water snake should also be present. On a rare occasion, a

Blanding's turtle could migrate upstream from its nearest known recorded habitat along the Pemigewasset River to the west. This possibility would be more likely should beavers again be allowed to inundate the ponds to a greater extent than they are currently.

### Fish

Only two fish species were seen in the waterways on the site. Both eastern brook trout and blacknose dace were seen in the flowing stream below the lowest beaver dam at the property edge. These common, clearwater stream species have also been seen upstream on the Smith property nearby. In terms of other fish, there is a small likelihood that warmwater species such as pumpkinseed sunfish and yellow perch could occur in the current beaver ponds, although the warm temperatures and likely low oxygen levels in fall probably preclude their survivability at these two sites. As with the deep water preferring reptile species, greater inundation of the two beaver ponds would allow for greater fish species diversity.



Eastern brook trout

### Invertebrates

Just 71 of the probable hundreds of species of invertebrates were recorded on the Smith-Sargent Property. This limited number was directly reflective of the limited sampling time on the parcel. The mix of species included earthworms, millipedes, slugs, ticks, spiders, and a number of insect groups, such as springtails, dragonflies, grasshoppers, true bugs, moths, butterflies, beetles, flies, and wasps. The largest group was the *Odonata*, including the variable dancer, aurora damsel, marsh bluet, eastern forktail,



Frosted whiteface *Leucorhinnia frigida*

sedge sprite, green darner, green-striped darner, black-tipped darner, American emerald, twin-spotted spiketail, beaverpond clubtail, frosted whiteface, Hudsonian whiteface, spangled skimmer, four-spotted skimmer, twelve-spotted skimmer, slaty skimmer, chalk-fronted corporal, common whitetail, and autumn meadowhawk. Most were observed during the latest field outing. This tally represents just one-third of the dragonflies and damselflies that have been observed by the author in Holderness, and so more species are likely.

The second largest group of invertebrates that were recorded for the property was *Diptera* (flies). In this case, just 10 of the 200-300 estimated species was observed during the field surveys. Again, time constraints limited the number of species observed. Salient species included phantom crane fly and European crane fly in the upper beaver pond area, robber fly and snipe fly in the alder alluvial swamp, and willow gall fly and goldenrod gall fly in the tall graminoid-scrub shrub marsh. The latter two species were observed by virtue of their diagnostic galls on their plant hosts.



Snipe flies *Rhagio mystaceus*

No pathogenic or invasive invertebrate was observed other than red earthworm and black-legged tick. Earthworms are not typically treated as invasive species even though they have wrought more ecological damage on native ecosystems than is commonly assumed. Black-legged (deer) tick has become “invasive” by virtue of their fairly recent spread by white-tailed deer and their predisposition for carrying Lyme disease and its co-infections. Two other species that are potentially problematic in certain years included the alder flea beetle and forest tent caterpillar moth. Both species have periodic outbreaks that can cause regional defoliation of their host plant species (i.e. speckled alder in the case of the alder flea beetle and cherry species in the case of the tent caterpillar).

### Fungi

The single site visit in fall was responsible for most of the 24 species of macro-fungi that were observed on the Smith-Sargent Property. The below average rainfall for the fall of 2015 limited the number of species observed, as did the poor (aka dry) mushroom weather this past spring. Mushroom species diversity was also limited by the small amount of upland forest that tends to produce many more observable species than wetland habitats. More than 50% of the fungi occurred on woody substrates, which is not uncommon during dry seasons when the only available moisture is present in wet log ‘reservoirs.’ One of the most notable species in this micro-habitat was *Multiclavula mucida*, which is one of the few *Basidiomycete* lichens in the Northeast. These tiny whitish ‘spears’ are no more than 1 – 1.5 cms in height, and grow only on logs that have a coating of compatible algae (*Chlorococcus* sp.). Most of the remaining wood inhabitants were in the large *Polypore* group, which are typically tough and woody, and shaped like ‘conks’ or shelves. Many of these species, especially the hemlock varnish shelf or Reishi and the turkey tails are known medicinal fungi that have immune boosting properties well known to science.



Fly agaric *Amanita muscaria*

## Summary & Recommendations

The 8.5-acre Town of Holderness property at the junction of Smith and Sargent Roads provides a remarkable wetland resource for the town. Over 65% of the parcel is jurisdictionally wet, as determined by soils and wetland plant analysis. These features were demonstrated during a training workshop in November 2015, wherein Holderness Conservation Commission members and other municipal officials were trained in wetland delineation on the site. Several different wetland plant communities are present on this small parcel, which has enhanced the richness and diversity of the site. Wetland-dependent wildlife and floodwater storage functions appear to be the two most salient attributes of the wetland complex; it is noteworthy that one of Holderness' prime wetland is hydrologically connected and immediately upstream of the Smith-Sargent Property wetland complex.

Most of the habitats of this property have been relatively undisturbed by past land use activities. Other than the two roadways that are immediately adjacent to the property, very little soil disturbance or alteration was noted. Two areas – one near the northwest corner and one near the inflow culvert on Sargent Road (as noted at "299" on the Soil Type Map), have been filled and/or scraped. The remaining upland and wetland areas have been kept intact. The forest has received at least one major logging event since it was allowed to revert back from its limited agricultural use in the 19<sup>th</sup> century. Stump evidence on the site indicate that this harvest was in the late 1970's. Only selective white pine and hemlock were removed, wherein much of the post-pasture regeneration forest remained untouched.

The single land use action that has had the greatest effect on the property has been the removal of beavers and the drawdown of the beaver ponds by breaching of the beaver dams. Based on historical aerial photo imagery, this appears to have most recently taken place in the past four years. This has caused the dewatering of the two major beaver ponds on the site and a regeneration of marsh grasses, sedges, and rushes. While this has had a positive influence on these plant species as well as the invertebrates that utilize them for feeding, resting, and breeding (notably dragonflies and damselflies), this has had a deleterious effect on migratory and breeding waterfowl, sandpipers, turtles, fish, and aquatic macro-invertebrates. While it is difficult to estimate the comparable values of loss versus gain in this situation, it is suggested that the HCC consider whether or not beavers need to be trapped out of the site in the future, as well as what other social values their presence may promote or hinder.

It is unclear as to whether or not the beaver trapping and drawdown has been a boon to the invasive plant species that were recorded for the site, yet with some good fortune, they appear to be few and far between. The most prevalent was glossy buckthorn (*Rhamnus frangula*), which was widespread in the upper dam area and was somewhat deformed as a result of repeated browsing by deer. Occasional individuals of this species was also found along the wetland edge along the entire eastern and western edge. Oriental bittersweet (*Celastrus orbiculatus*) was represented by just one plant along Smith Road in the southeast corner. No other plants were seen, although the remaining roadsides should be checked thoroughly. The only other invasive plant was coltsfoot (*Tussilago farfara*), which was present in one patch on the western side of the upper beaver pond in an excavated ditch. No purple loosestrife (*Lythrum salicaria*) or Morrow's honeysuckle (*Lonicera morrow*) were seen, although these facultative wetland species occur nearby in comparable habitats.

In terms of accessing the site for research and educational purposes, there are several possibilities available to the Commission and the town. During the November training session, one of these was presented to the Commission relative to a clearing of a selected number of trees for a parking area. The

area in question was the site of one of the previous cut-and-fill sites just north of GPS point #476 on the Aerial Base Map. The other area that is suggested is the other cut and fill site designated on the Soil Map as "299" in the northwestern part of the property. This area also has received disturbance in the past and could easily be reconverted to an open parking area with little grade. Other sections off the property either have too much slope, are too close to wetlands, or would encourage sediment transport into open water bodies.

Summary recommendations include the following:

- 1) Address the beaver trapping issue at a public forum that encourages the public works personnel and local neighbors to attend
- 2) Maintain a regular surveillance of the invasive species on the site and seek to remove the glossy buckthorn, bittersweet, and coltsfoot before it spreads
- 3) Encourage local schools to conduct ongoing research at the site using this NRI as baseline information for further studies
- 4) Design and construct a small parking area for public visitors to the property that holds no more than three or four cars
- 5) After engaging local school use and establishing a parking area, consider constructing a boardwalk that allows for easy access to the lower part of the wetland system while keeping the upper part free of human disturbance and use
- 6) Consider nominating the entire wetland system south and west of Smith and Sargent Roads as a prime wetland to further protection of the prime wetland to the southeast
- 7) More clearly identify the boundaries of the property to prevent any potential conflicts regarding land uses by neighbors and inadvertent trespass by the general public



**Typical woods near the second possible parking area in the NW part of the lot**

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# **Appendices**

## **A) Maps**

- 1. Aerial Base Map with GPS**
- 2. Soils Map**
- 3. Wetland Map**
- 4. Cover Type Map**
- 5. Mammal Transect Map**

## **B) Species Lists**

- 1. Plants**
- 2. Wildlife & Fungi**

## **C) Mammal Transect Summary**

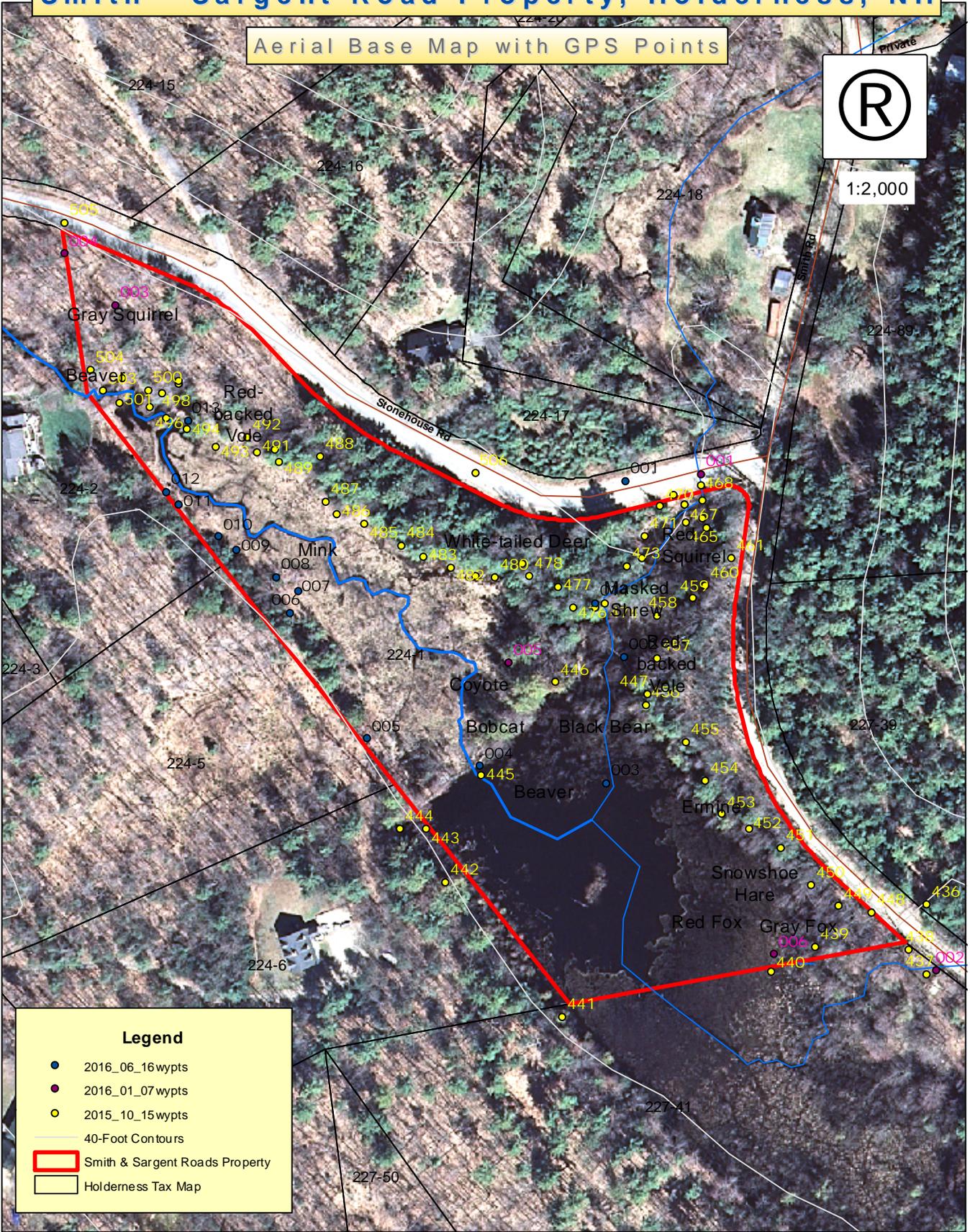
## **D) Mammal Transect Chart**

# Smith - Sargent Road Property, Holderness, NH

Aerial Base Map with GPS Points

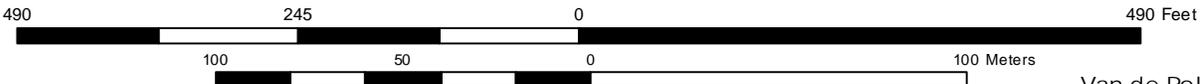


1:2,000



**Legend**

- 2016\_06\_16 wypts
- 2016\_01\_07 wypts
- 2015\_10\_15 wypts
- 40-Foot Contours
- Smith & Sargent Roads Property
- Holderness Tax Map

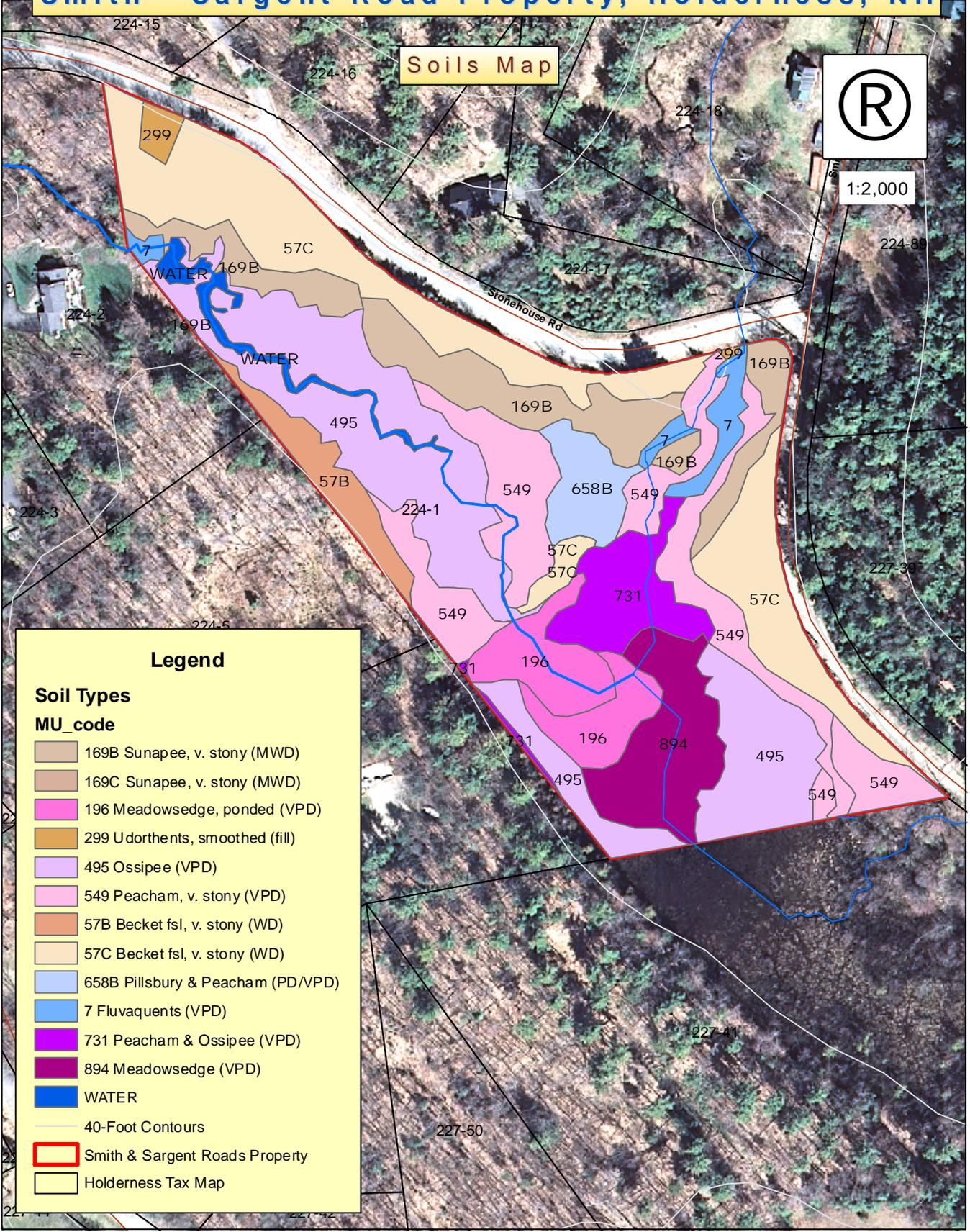


# Smith - Sargent Road Property, Holderness, NH

## Soils Map



1:2,000



### Legend

**Soil Types**

MU_code	Soil Type
	169B Sunapee, v. stony (MWD)
	169C Sunapee, v. stony (MWD)
	196 Meadowsedge, ponded (VPD)
	299 Udorthents, smoothed (fill)
	495 Ossipee (VPD)
	549 Peacham, v. stony (VPD)
	57B Becket fsl, v. stony (WD)
	57C Becket fsl, v. stony (WD)
	658B Pillsbury & Peacham (PD/VPD)
	7 Fluvaquents (VPD)
	731 Peacham & Ossipee (VPD)
	894 Meadowsedge (VPD)
	WATER
	40-Foot Contours
	Smith & Sargent Roads Property
	Holderness Tax Map

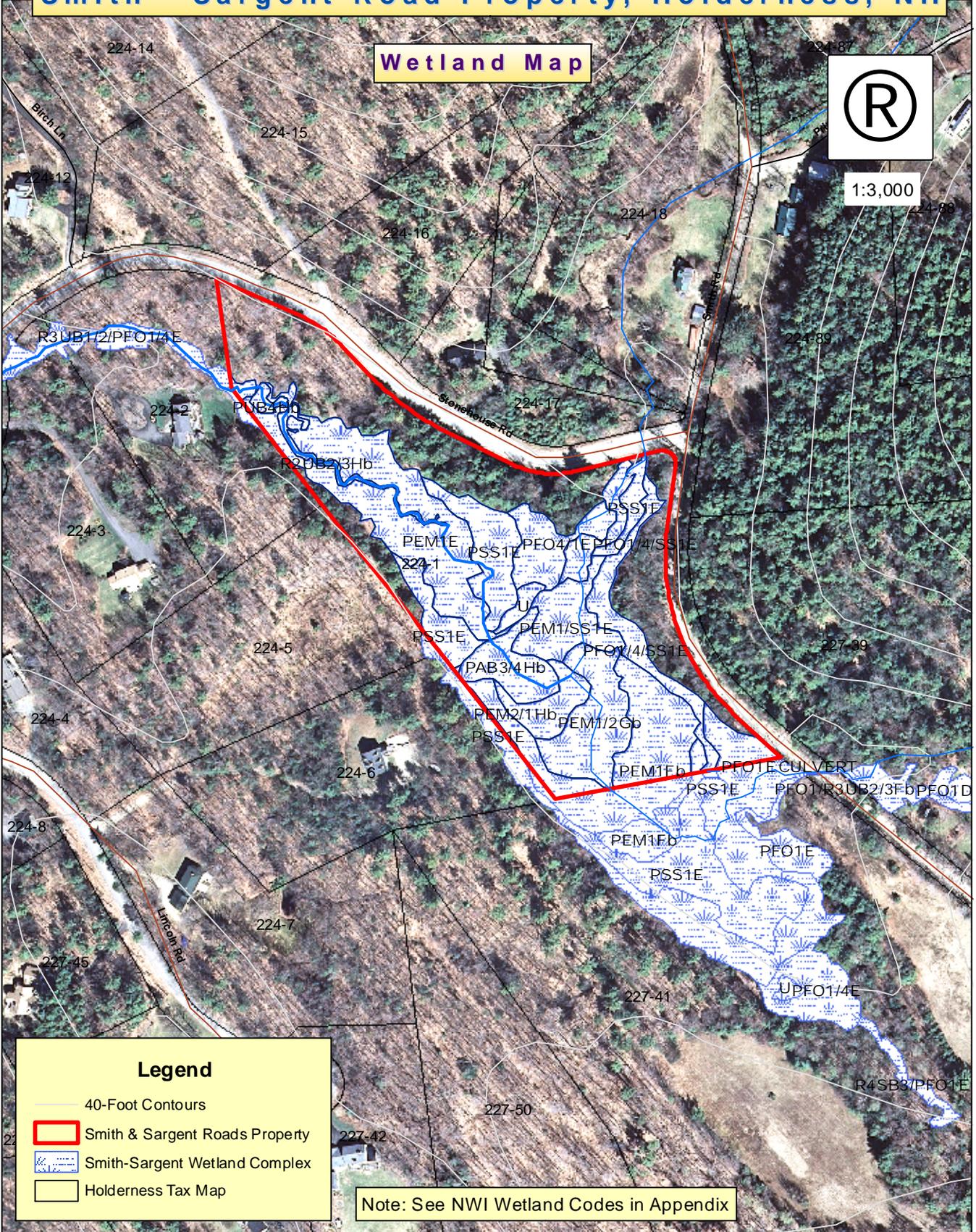


# Smith - Sargent Road Property, Holderness, NH

## Wetland Map



1:3,000



**Legend**

- 40-Foot Contours
- Smith & Sargent Roads Property
- Smith-Sargent Wetland Complex
- Holderness Tax Map

Note: See NWI Wetland Codes in Appendix

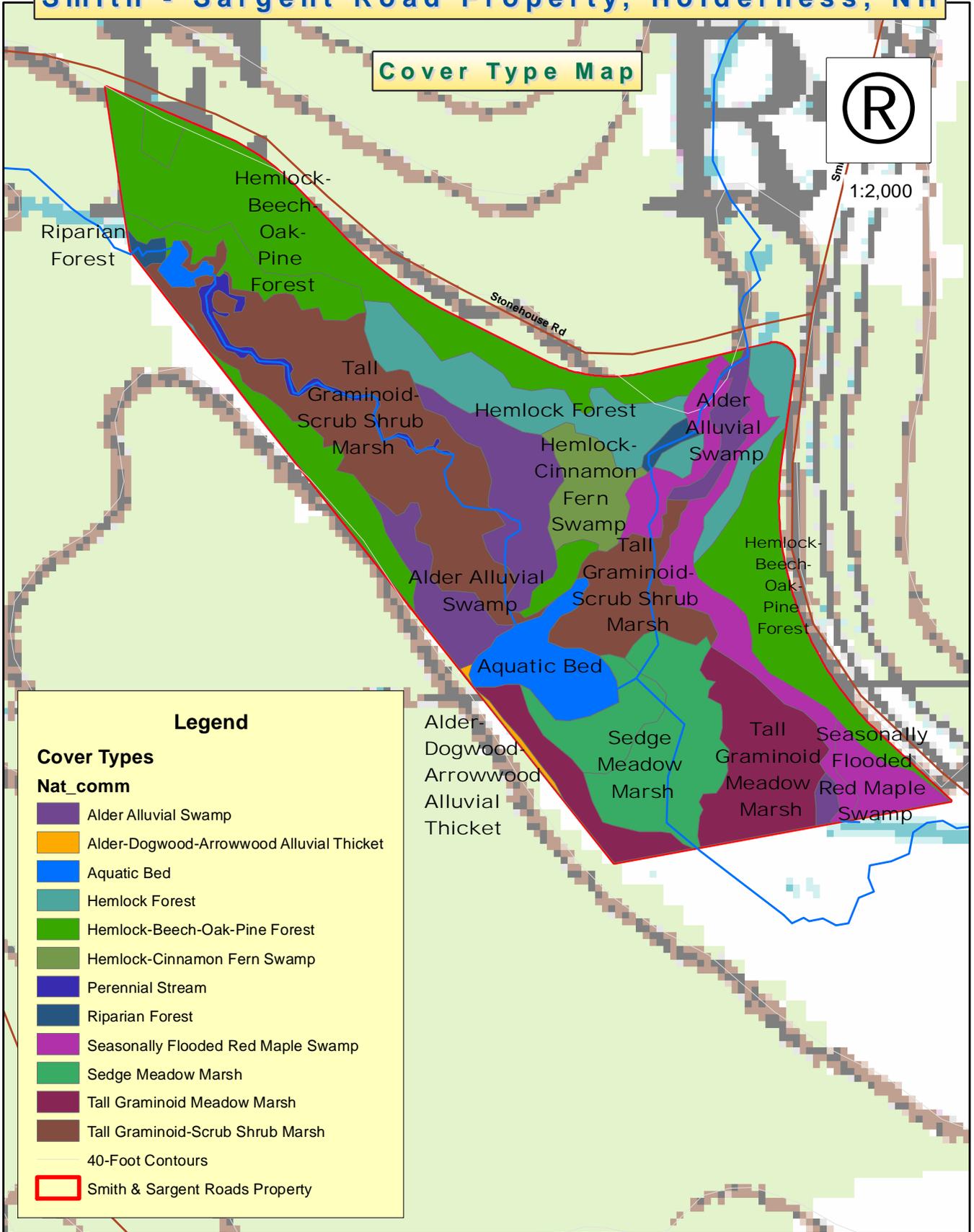


# Smith - Sargent Road Property, Holderness, NH

## Cover Type Map



1:2,000



### Legend

**Cover Types**

	Alder Alluvial Swamp
	Alder-Dogwood-Arrowwood Alluvial Thicket
	Aquatic Bed
	Hemlock Forest
	Hemlock-Beech-Oak-Pine Forest
	Hemlock-Cinnamon Fern Swamp
	Perennial Stream
	Riparian Forest
	Seasonally Flooded Red Maple Swamp
	Sedge Meadow Marsh
	Tall Graminoid Meadow Marsh
	Tall Graminoid-Scrub Shrub Marsh
	40-Foot Contours
	Smith & Sargent Roads Property



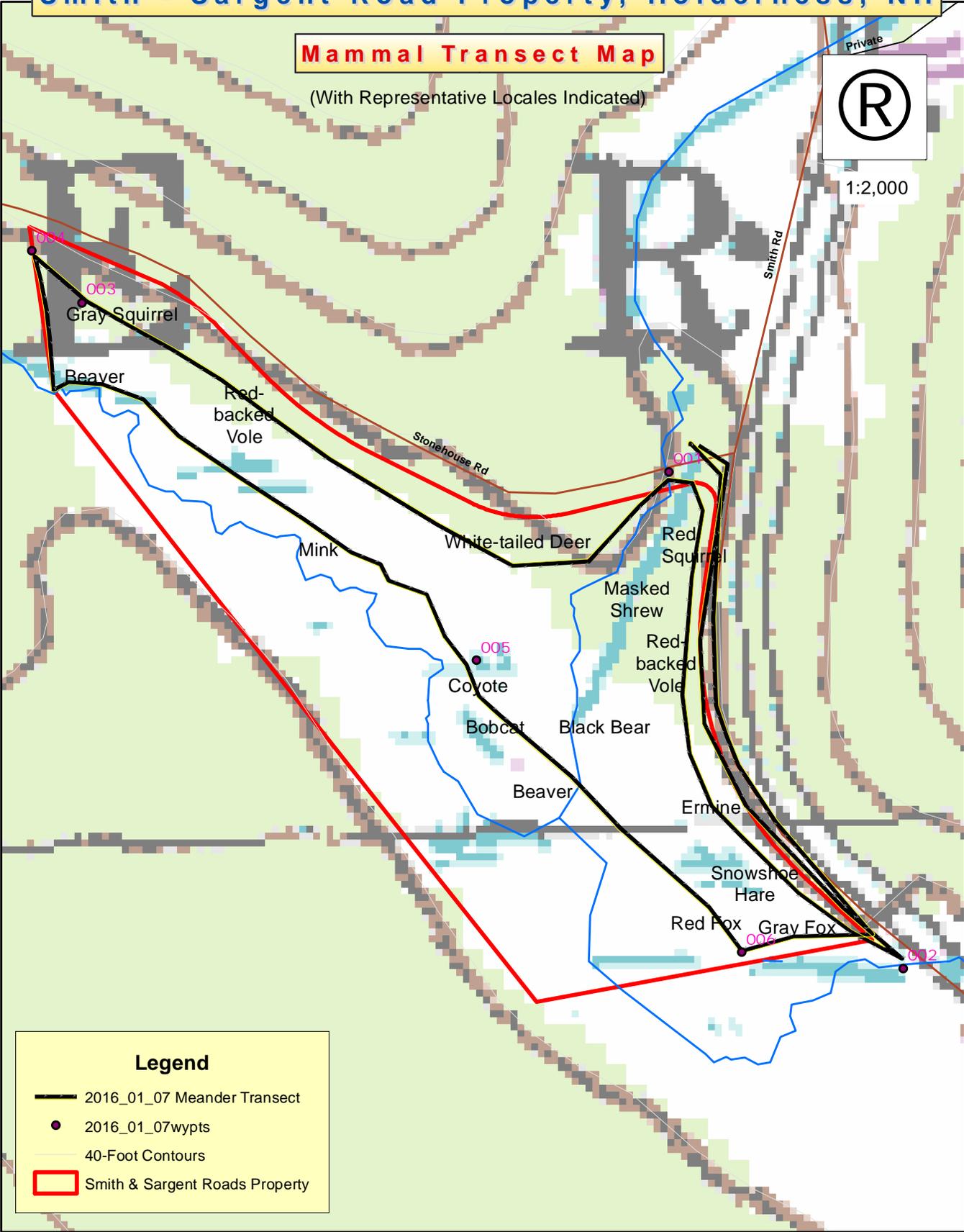
# Smith - Sargent Road Property, Holderness, NH

## Mammal Transect Map

(With Representative Locales Indicated)



1:2,000



**Legend**

- 2016\_01\_07 Meander Transect
- 2016\_01\_07 wypts
- - - 40-Foot Contours
- ▭ Smith & Sargent Roads Property



Van de Poil / EMC

Smith-Sargent Road NRI - Plant Species List						
Alien	Scientific Name	Common Name	ABBREV.	Family	R1IND	Habit
	<i>Abies balsamea</i>	Fir, Balsam	ABIBAL	Pinaceae	FAC	T
	<i>Acer pensylvanicum</i>	Maple, Striped	ACEPEN	Sapindaceae	FACU	S,T
	<i>Acer rubrum</i>	Maple, Red	ACERUB	Sapindaceae	FAC	T
	<i>Acer saccharum</i>	Maple, Sugar	ACESAC2	Sapindaceae	FACU	T
	<i>Achillea millefolium</i>	Yarrow	ACHMIL	Asteraceae	FACU	H
	<i>Agrimonia gryposepala</i>	Groovebur, Tall Hairy	AGRGRY	Rosaceae	FACU	H
*	<i>Agrostis capillaris</i> (tenuis)	Bentgrass, Slender	AGRCAP	Poaceae	FAC	H
	<i>Agrostis gigantea</i>	Grass, Red Top	AGRGIG	Poaceae	FACW	H
	<i>Agrostis perennans</i>	Bentgrass, Perennial	AGRPER	Poaceae	FACU	H
	<i>Agrostis scabra</i>	Bentgrass, Rough	AGRSCA	Poaceae	FAC	H
	<i>Alnus incana</i> ssp. <i>rugosa</i>	Alder, Speckled	ALNINC	Betulaceae	FACW	S
	<i>Ambrosia artemisiifolia</i>	Ragweed, Annual	AMBART	Asteraceae	FACU	H
	<i>Amelanchier arborea</i>	Serviceberry, Downy	AMEARB	Rosaceae	FACU	S,T
	<i>Amphicarpaea bracteata</i>	Hog-Peanut, American	AMPBRA	Fabaceae	FAC	H
	<i>Anemone quinquefolia</i> var. <i>quinquefolia</i>	Thimble-weed, Woodland	ANEQUIQ	Ranunculaceae	FACU	H
*	<i>Anthoxanthum odoratum</i>	Grass, Sweet Vernal	ANTODO	Poaceae	FACU	H
	<i>Apios americana</i>	Potato-bean, American	APIAME	Fabaceae	FACW	H
	<i>Apocynum androsaemifolium</i>	Dogbane, Spreading	APOAND	Apocynaceae	UPL	H
	<i>Aralia hispida</i>	Sarsaparilla, Bristly	ARAHIS	Araliaceae	UPL	H,DS
	<i>Aralia nudicaulis</i>	Sarsaparilla, Wild	ARANUD	Araliaceae	FACU	H,DS
	<i>Arisaema triphyllum</i> ssp. <i>triphyllum</i>	Jack-in-the-Pulpit, Swamp	ARITRIT	Araceae	FAC	H
	<i>Aronia melanocarpa</i>	Chokeberry, Black	AROMEL	Rosaceae	FAC	S
*	<i>Artemisia vulgaris</i>	Wormwood	ARTVUL	Asteraceae	UPL	H
	<i>Athyrium filix-femina</i> var. <i>angustum</i>	Lady Fern	ATHFIL	Woodsiaceae	FAC	F
	<i>Betula alleghaniensis</i>	Birch, Yellow	BETALL	Betulaceae	FAC	T
	<i>Betula lenta</i>	Birch, Black	BETLEN	Betulaceae	FACU	T
	<i>Betula papyrifera</i>	Birch, Paper or White	BETPAP	Betulaceae	FACU	T
	<i>Betula populifolia</i>	Birch, Gray	BETPOP	Betulaceae	FAC	T
	<i>Bidens frondosa</i>	Beggar-ticks, Devil's	BIDFRO	Asteraceae	FACW	H
	<i>Boehmeria cylindrica</i>	False-Nettle, Small-spike	BOEICYL	Urticaceae	OBL	H
	<i>Brachyelytrum aristosum</i> (=B. <i>erectum</i> var. <i>septentrionale</i> )	Grass, Woodland	BRAARI	Poaceae	FACU?	H
	<i>Brasenia schreberi</i>	Watershield	BRASCH	Nymphaeaceae	OBL	H
	<i>Calamagrostis canadensis</i>	Reedgrass, Bluejoint	CALCAN	Poaceae	OBL	H
	<i>Calla palustris</i>	Calla, Wild	CALPAL1	Araceae	OBL	H
	<i>Callitriche palustris</i>	Water-starwort, Spiny	CALPAL2	Plantaginaceae	OBL	H
	<i>Cardamine pennsylvanica</i>	Bittercress, Pennsylvania	CARDPEN	Brassicaceae	FACW	H
	<i>Carex arctata</i>	Sedge, Drooping Wood	CARARC2	Cyperaceae	FACU?	H
	<i>Carex atlantica</i> var. <i>capillacea</i> (incl. <i>C. howei</i> )	Sedge, Eastern	CARATLC	Cyperaceae	FACW	H
	<i>Carex brunnescens</i> var. <i>brunnescens</i>	Sedge, Brownish Lowland	CARBRUB	Cyperaceae	FACW	H
	<i>Carex canescens</i>	Sedge, Hoary	CARCAN	Cyperaceae	OBL	H
	<i>Carex crinita</i>	Sedge, Fringed	CARCRI1	Cyperaceae	OBL	H
	<i>Carex debilis</i>	Sedge, White-edge	CARDEB	Cyperaceae	FACW	H
	<i>Carex echinata</i> (= <i>C. muricata</i> )	Sedge, Little Prickly	CARECH	Cyperaceae	OBL	H
	<i>Carex folliculata</i>	Sedge, Long	CARFOL	Cyperaceae	OBL	H
	<i>Carex intumescens</i>	Sedge, Bladder	CARINT	Cyperaceae	FACW	H
	<i>Carex lacustris</i>	Sedge, Lakebank	CARLAC	Cyperaceae	OBL	H
	<i>Carex lasiocarpa</i> ssp. <i>americana</i>	Sedge, Wire	CARLASA	Cyperaceae	OBL	H
	<i>Carex lurida</i>	Sedge, Lurid	CARLUR	Cyperaceae	OBL	H
	<i>Carex normalis</i>	Sedge, Larger Straw	CARNOR	Cyperaceae	FACW	H
	<i>Carex pensylvanica</i>	Sedge, Pennsylvania	CARPEN	Cyperaceae	UPL	H
	<i>Carex projecta</i>	Sedge, Necklace	CARPRO	Cyperaceae	FACW	H
	<i>Carex scabrata</i>	Sedge, Rough	CARSCA	Cyperaceae	OBL	H
	<i>Carex stipata</i>	Sedge, Stalk-grain	CARSTI	Cyperaceae	OBL	H
	<i>Carex stricta</i>	Sedge, Upright or Tussock	CARSTR2	Cyperaceae	OBL	H
	<i>Carex swanii</i>	Sedge, Swan's	CARSWA	Cyperaceae	FACU	H
	<i>Carex tribuloides</i>	Sedge, Blunt Broom	CARTRI1	Cyperaceae	FACW	H
	<i>Carex trisperma</i> var. <i>trisperma</i>	Sedge, Three-Seed	CARTRIT	Cyperaceae	OBL	H
	<i>Carex utriculata</i>	Sedge, Beaked (Bottle-shaped)	CARUTR	Cyperaceae	OBL	H
	<i>Carpinus caroliniana</i>	Hornbeam, American	CARCAR	Betulaceae	FAC	S,T
*	<i>Celastrus orbiculatus</i>	Bittersweet, European	CELORB	Celastraceae	UPL	WV,S
	<i>Cephalanthus occidentalis</i>	Buttonbush	CEPOCC	Rubiaceae	OBL	S
*	<i>Cerastium fontanum</i> ssp. <i>vulgare</i>	Chickweed, Mouse-Ear	CERFON	Caryophyllaceae	FACU	H
	<i>Chamaedaphne calyculata</i>	Leatherleaf	CHACAL	Ericaceae	OBL	S
	<i>Chamaepericlymenum</i> (= <i>Cornus</i> ) <i>canadensis</i>	Bunchberry, Canada	CHACAN	Cornaceae	FAC	H,DS
	<i>Chelone glabra</i>	Turtlehead, White	CHEGLA	Plantaginaceae	OBL	H

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	<i>Chrysosplenium americanum</i>	Golden-saxifrage, American	CHRAME	Saxifragaceae	OBL	H
*	<i>Cichorium intybus</i>	Chicory	CHIINT	Asteraceae	FACU	H
	<i>Cinna latifolia</i>	Wood-reedgrass, Slender	CINLAT	Poaceae	FACW	H
	<i>Clematis virginiana</i>	Virgin's-Bower, Virginia	CLEVIR	Ranunculaceae	FAC	WV
	<i>Clintonia borealis</i>	Bead-Lily, Blue	CLIBOR	Liliaceae	FAC	H
	<i>Comptonia peregrina</i>	Sweetfern	COMPER	Myricaceae	UPL	S
	<i>Coptis trifolia</i> (= <i>C. groenlandica</i> )	Goldthread	COPTRI	Ranunculaceae	FACW	H
	<i>Corylus cornuta</i>	Hazelnut, Beaked	CORCOR	Betulaceae	FACU	S
	<i>Cypripedium acaule</i>	Lady's-Slipper, Pink	CYPACA	Orchidaceae	FACU	H
	<i>Danthonia spicata</i>	Wild Oat or Poverty Grass	DANSPI	Poaceae	UPL	H
	<i>Decodon verticillatus</i>	Swamp-Loosestrife, Hairy	DECVER	Lythraceae	OBL	S,H
	<i>Dendrolycopodium obscurum</i> (= <i>Lycopodium</i> o.)	Clubmoss, Flat-branched Tree	DENOBS	Lycopodiaceae	FACU	F
	<i>Dennstaedtia punctilobula</i>	Hay-scented Fern	DENPUN	Dennstaedtiaceae	UPL	F
	<i>Dichanthelium</i> (= <i>Panicum</i> ) <i>acuminatum</i>	Grass, Tapered Panic	DICACU	Poaceae	FAC	H
	<i>Dichanthelium</i> (= <i>Panicum</i> ) <i>clandestinum</i>	Grass, Deer-tongue	DICCLA	Poaceae	FACW	H
	<i>Diervilla lonicera</i>	Honeysuckle, Bush-	DIELON	Caprifoliaceae	UPL	S
	<i>Diphasiastrum digitatum</i> (= <i>Lycopodium flabelliforme</i> )	Running-pine, Southern	DIPDIG	Lycopodiaceae	UPL	F
	<i>Doellingeria</i> (= <i>Aster</i> ) <i>umbellatus</i>	Aster, Flat-Topped	DOEUMB	Asteraceae	FACW	H
	<i>Drosera intermedia</i>	Sundew, Spoon-leaf	DROINT	Droseraceae	OBL	H
	<i>Drosera rotundifolia</i>	Sundew, Round-leaved	DROROT	Droseraceae	OBL	H
	<i>Dryopteris carthusiana</i>	Woodfern, Spinulose	DRYCAR	Dryopteridaceae	FACW	F
	<i>Dryopteris cristata</i>	Shield-fern, Crested	DRYCRI	Dryopteridaceae	OBL	F
	<i>Dryopteris intermedia</i>	Woodfern, Evergreen	DRYINT	Dryopteridaceae	FAC	F
	<i>Dulichium arundinaceum</i>	Sedge, Three-way	DULARU	Cyperaceae	OBL	H
	<i>Eleocharis acicularis</i>	Spikesedge, Least	ELEACI	Cyperaceae	OBL	H
	<i>Eleocharis palustris</i> ssp. <i>palustris</i>	Spikesedge, Common	ELEPAL	Cyperaceae	OBL	H
	<i>Eleocharis tenuis</i>	Spikesedge, Slender	ELETEN	Cyperaceae	FACW	H
	<i>Epifagus virginiana</i>	Beechdrops	EPIVIR	Orobanchaceae	UPL	H
	<i>Epigaea repens</i>	Arbutus, Trailing	EPIREP	Ericaceae	UPL	H,DS
	<i>Epilobium ciliatum</i> var. <i>glandulosum</i> (= <i>E. g.</i> )	Willow-herb, Northern	EPICILG	Onagraceae	FACW	H
	<i>Epilobium leptophyllum</i>	Willow-herb, Linear-leaf	EPILEP	Onagraceae	OBL	H
	<i>Equisetum arvense</i> (incl. var. <i>boreale</i> )	Horsetail, Field	EQUARV	Equisetaceae	FAC	F
	<i>Equisetum sylvaticum</i>	Horsetail, Woodland	EQUAYL	Equisetaceae	FACW	F
	<i>Erigeron</i> (= <i>Conyza</i> ) <i>canadensis</i>	Horseweed	CONCAN	Asteraceae	UPL	H
	<i>Erigeron pulchellus</i>	Robin's-Plantain	ERIPUL	Asteraceae	FACU	H
	<i>Eupatorium perfoliatum</i>	Boneset, Common	EUPPER	Asteraceae	FACW	H
	<i>Eurybia</i> (= <i>Aster</i> ) <i>divaricata</i>	Aster, White Wood	EURDIV	Asteraceae	UPL	H
	<i>Eurybia</i> (= <i>Aster</i> ) <i>macrophylla</i>	Aster, Large-Leaved	EURMAC	Asteraceae	UPL	H
	<i>Euthamia graminifolia</i> (= <i>Solidago g.</i> )	Fragrant-Golden-Rod, Flat-Top	EUTGRAG	Asteraceae	FAC	H
	<i>Eutrochium</i> (= <i>Eupatorium</i> ) <i>maculatum</i>	Joe-Pye-Weed, Spotted	EUTMAC	Asteraceae	OBL	H
	<i>Fagus grandifolia</i>	Beech, American	FAGGRA	Fagaceae	FACU	T
	<i>Fragaria vesca</i>	Strawberry, Wood	FRAVES	Rosaceae	UPL	H
*	<i>Frangula alnus</i> (= <i>Rhamnus f.</i> )	Buckthorn, Glossy or European	FRAALN	Rhamnaceae	FAC	S
	<i>Fraxinus americana</i>	Ash, White	FRAAME	Oleaceae	FACU	T
	<i>Fraxinus nigra</i>	Ash, Black	FRANIG	Oleaceae	FACW	T
	<i>Galium aparine</i>	Bedstraw, Catchweed	GALAPA	Rubiaceae	FACU	H
	<i>Galium palustre</i>	Bedstraw, Marsh	GALPAL	Rubiaceae	OBL	H
	<i>Galium tinctorium</i> var. <i>tinctorium</i>	Bedstraw, Stiff Marsh	GALTINT	Rubiaceae	OBL	H
	<i>Gaultheria hispidula</i>	Snowberry, Creeping	GAUHIS	Ericaceae	FACW	H,DS
	<i>Gaultheria procumbens</i>	Wintergreen	GAUPRO	Ericaceae	FACU	H,DS
	<i>Gaylussacia baccata</i>	Huckleberry, Black	GAYBAC	Ericaceae	FACU	S
	<i>Geum laciniatum</i> var. <i>laciniatum</i>	Avens, Rough	GEULACL	Rosaceae	FACW	H
	<i>Glyceria canadensis</i>	Mannagrass, Canada	GLYCAN	Poaceae	OBL	H
	<i>Glyceria striata</i>	Mannagrass, Fowl	GLYSTR	Poaceae	OBL	H
	<i>Gratiola aurea</i>	Hedge-Hyssop, Golden	GRAAUR	Plantaginaceae	OBL	H
	<i>Gymnocarpium dryopteris</i>	Fern, Oak	GYMDRY	Woodsiaceae	FACU	F
	<i>Hamamelis virginiana</i>	Witch-hazel, American	HAMVIR	Hamamelidaceae	FACU	S
*	<i>Hieracium vulgatum</i>	Hawkweed, Common	HIEVUL	Asteraceae	UPL	H
	<i>Houstonia caerulea</i>	Innocence or Bluets	HOUCAE	Rubiaceae	FACU	H
	<i>Huperzia lucidula</i> (= <i>Lycopodium lucidulum</i> )	Fir-moss, Shining	HUPLUC	Huperziaceae	FAC	F
	<i>Hydrocotyle americana</i>	Water Pennywort	HYDAME	Apiaceae	OBL	H
*	<i>Hylotelephium telephium</i> ssp. <i>fabaria</i>	Live-forever	HYLTEL	Crassulaceae	UPL	H
	<i>Hypericum ellipticum</i>	St. Johnswort, Pale	HYPELL	Hypericaceae	OBL	H
	<i>Hypericum mutilum</i>	St. Johnswort, Slender or Dwarf	HYPMUT	Hypericaceae	FACW	H
*	<i>Hypericum perforatum</i> ssp. <i>perforatum</i>	St. Johnswort, Common	HYPPERP	Hypericaceae	UPL	H
	<i>Ilex</i> (= <i>Nemopanthus</i> ) <i>mucronata</i>	Holly, Mountain	ILEMUC	Aquifoliaceae	OBL	S

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	<i>Ilex verticillata</i>	Winterberry, Common	ILEVER	Aquifoliaceae	FACW	S
	<i>Impatiens capensis</i>	Touch-me-not, Spotted	IMPCAP	Balsaminaceae	FACW	H
	<i>Iris versicolor</i>	Blue flag	IRIVER	Iridaceae	OBL	H
	<i>Juncus brevicaudatus</i>	Rush, Narrow Panicle	JUNBRE	Juncaceae	OBL	H
	<i>Juncus canadensis</i>	Rush, Canada	JUNCAN	Juncaceae	OBL	H
	<i>Juncus pylaei</i>	Rush, Pylae's Soft	JUNPYL	Juncaceae	OBL	H
	<i>Juncus tenuis</i>	Rush, Slender	JUNTEN	Juncaceae	FAC	H
	<i>Kalmia angustifolia</i>	Laurel, Sheep	KALANG	Ericaceae	FAC	S
	<i>Lactuca biennis</i>	Lettuce, Biennial (Tall Blue)	LACBIE	Asteraceae	FAC	H
	<i>Leersia oryzoides</i>	Cut-grass, Rice	LEEORY	Poaceae	OBL	H
	<i>Lemna minor</i>	Duckweed, Lesser	LEMMIN	Araceae	OBL	H
*	<i>Leucanthemum vulgare</i> Lam. (= <i>Chrysanthemum</i> l.)	Daisy, Oxeye	LEUVUL	Asteraceae	UPL	H
	<i>Ludwigia palustris</i>	Seedbox, Marsh	LUDPAL	Onagraceae	OBL	H
	<i>Lycopus uniflorus</i>	Bugleweed, Northern	LYCUNI	Lamiaceae	OBL	H
	<i>Lyonia ligustrina</i>	Maleberry	LYOLIG	Ericaceae	FACW	S
	<i>Lysimachia</i> (= <i>Trientalis</i> ) <i>borealis</i>	Starflower	LYSBOR	Myrsinaceae	FAC	H
	<i>Lysimachia ciliata</i>	Loosestrife, Fringed	LYSCIL	Myrsinaceae	FACW	H
	<i>Lysimachia terrestris</i>	Loosestrife, Swamp (Candles)	LYSTER	Myrsinaceae	OBL	H
	<i>Maianthemum canadense</i>	Mayflower, Canada	MAICAN	Ruscaceae	FACU	H
	<i>Maianthemum racemosum</i> ssp. <i>racemosum</i> (= <i>Smilacin</i> )	False-Solomon's-Seal, Feather	MAIRACR	Ruscaceae	FACU	H
	<i>Matteuccia struthiopteris</i> ssp. <i>pennsylvanica</i>	Fern, Ostrich	MATSTRP	Onocleaceae	FAC	F
	<i>Medeola virginiana</i>	Indian Cucumber Root	MEDVIR	Liliaceae	UPL	H
	<i>Mitchella repens</i>	Partridgeberry	MITREP	Rubiaceae	FACU	H,DS
	<i>Monotropa uniflora</i>	Indian Pipe	MONUNI2	Ericaceae	FACU	H
	<i>Myrica gale</i>	Sweet Gale	MYRGAL	Myricaceae	OBL	S
	<i>Nabalus</i> (= <i>Prenanthes</i> ) <i>trifoliolatus</i>	Gall-of-the-Earth	NABTRI	Asteraceae	UPL	H
	<i>Nuphar variegata</i>	Cow-lily, Yellow or Spatterdock	NUPVAR	Nymphaeaceae	OBL	H
	<i>Nuttallanthus</i> (= <i>Linaria</i> ) <i>canadensis</i>	Toadflax, Blue	NUTCAN	Plantaginaceae	UPL	H
	<i>Oclemena</i> (= <i>Aster</i> ) <i>acuminatus</i>	Aster, Whorled	OCLACU	Asteraceae	FACU	H
	<i>Onoclea sensibilis</i>	Fern, Sensitive	ONOSEN	Onocleaceae	FACW	F
	<i>Osmunda cinnamomea</i>	Cinnamon Fern	OSMCIN	Osmundaceae	FACW	F
	<i>Osmunda claytoniana</i>	Interrupted Fern	OSMCLA2	Osmundaceae	FAC	F
	<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal Fern	OSMREG	Osmundaceae	OBL	F
	<i>Ostrya virginiana</i>	Hop-Hornbeam	OSTVIR	Betulaceae	FACU	T
	<i>Oxalis stricta</i> (incl. <i>O. europaea</i> )	Woodsorrel, Yellow	OXASTR	Oxalidaceae	FACU	H
	<i>Parathelypteris</i> (= <i>Thelypteris</i> ) <i>noveboracensis</i>	Fern, New York	PARNOV	Thelypteridaceae	FAC	F
	<i>Parthenocissus quinquefolia</i>	Virginia Creeper	PARQUI	Vitaceae	FACU	WV
*	<i>Persicaria</i> (= <i>Polygonum</i> ) <i>maculosa</i> (= <i>persicaria</i> )	Lady's Thumb	PERMAC	Polygonaceae	FAC	H
	<i>Persicaria</i> (= <i>Polygonum</i> ) <i>sagittata</i>	Tearthumb, Arrow-leaved	PERSAG	Polygonaceae	OBL	H
	<i>Phegopteris connectilis</i> (= <i>Thelypteris</i> p.)	Fern, Long Beech	PHECON	Thelypteridaceae	FACU	F
	<i>Picea rubens</i>	Spruce, Red	PICRUB	Pinaceae	FACU	T
	<i>Pinus strobus</i>	Pine, Eastern White	PINSTR	Pinaceae	FACU	T
	<i>Poa palustris</i>	Bluegrass, Swamp	POAPAL	Poaceae	FACW	H
*	<i>Poa pratensis</i> ssp. <i>pratensis</i>	Bluegrass, Kentucky	POAPRA	Poaceae	FACU	H
	<i>Polygala paucifolia</i>	Gay-Wings	POLPAU	Polygalaceae	FACU	H
	<i>Pontederia cordata</i>	Pickereel-weed	PONCOR	Pontederiaceae	OBL	H
	<i>Populus grandidentata</i>	Aspen, Bigtooth	POPGRA	Salicaceae	FACU-	T
	<i>Potamogeton epihydrus</i>	Pondweed, Ribbonleaf	POTEPI	Potamogetonaceae	OBL	H
	<i>Potentilla simplex</i>	Cinquefoil, Old Field or Common	POTSIM	Rosaceae	FACU	H
*	<i>Prunella vulgaris</i> ssp. <i>vulgaris</i>	Heal-all	PRUVULV	Lamiaceae	FAC	H
	<i>Prunus pensylvanica</i> var. <i>pennsylvanica</i>	Cherry, Fire	PRUPENP	Rosaceae	FACU	T
	<i>Prunus serotina</i> var. <i>serotina</i>	Cherry, Black	PRUSERS	Rosaceae	FACU	T
	<i>Pteridium aquilinum</i> ssp. <i>latiusculum</i>	Fern, Bracken	PTEAQU	Dennstaedtiaceae	FACU	F
	<i>Quercus rubra</i>	Oak, Northern Red	QUERUB	Fagaceae	FACU	T
*	<i>Ranunculus acris</i>	Buttercup, Tall	RANACR	Ranunculaceae	FAC	H
	<i>Rosa palustris</i>	Rose, Swamp	ROSPAL	Rosaceae	OBL	S
	<i>Rubus allegheniensis</i>	Blackberry, Allegheny	RUBALL	Rosaceae	FACU	S
	<i>Rubus dalibarda</i> (= <i>Dalibarda repens</i> )	Robin-run-away	RUBDAL	Rosaceae	FAC	H
	<i>Rubus hispidus</i>	Blackberry, Bristly (Dewberry)	RUBHIS	Rosaceae	FACW	S
	<i>Rubus idaeus</i>	Raspberry, Common Red	RUBIDA	Rosaceae	FACU	S
	<i>Rubus pubescens</i>	Blackberry, Dwarf	RUBPUB	Rosaceae	FACW	H
*	<i>Rumex crispus</i> ssp. <i>crispus</i>	Dock, Curly or Yellow	RUMCRIC	Polygonaceae	FAC	H
*	<i>Rumex obtusifolius</i> ssp. <i>obtusifolius</i>	Dock, Bitter	RUMOBTO	Polygonaceae	FAC	H
	<i>Salix discolor</i>	Willow, Pussy	SALDIS	Salicaceae	FACW	S
	<i>Salix lucida</i> ssp. <i>lucida</i>	Willow, Shining	SALLUCL	Salicaceae	FACW	S
	<i>Sambucus nigra</i> ssp. <i>canadensis</i> (= <i>V. c.</i> )	Elder, American	SAMNIGC	Adoxaceae	FACW	S

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	<i>Scirpus atrocinctus</i>	Bulrush, Blackgirdle	SCIATR	Cyperaceae	OBL	H
	<i>Scirpus cyperinus</i>	Wool-grass	SCICYP	Cyperaceae	OBL	H
	<i>Scirpus expansus</i>	Bulrush, Woodland	SCIEXP	Cyperaceae	OBL	H
	<i>Solidago bicolor</i>	Silverrod	SOLBIC	Asteraceae	UPL	H
	<i>Solidago flexicaulis</i>	Goldenrod, Zig-Zag	SOLFLE	Asteraceae	FACU	H
	<i>Solidago gigantea</i>	Goldenrod, Late	SOLGIG	Asteraceae	FACW	H
	<i>Solidago juncea</i>	Goldenrod, Early	SOLJUN	Asteraceae	UPL	H
	<i>Solidago rugosa</i> ssp. <i>rugosa</i>	Goldenrod, Wrinkled	SOLRUGR	Asteraceae	FAC	H
	<i>Sparganium americanum</i>	Bur-reed, American	SPAAME	Typhaceae	OBL	H
	<i>Spinulum annotinum</i> (= <i>Lycopodium</i> a.)	Clubmoss, Stiff or Bristly	SPIANN	Lycopodiaceae	FAC	F
	<i>Spiraea alba</i> var. <i>latifolia</i> (= <i>S. latifolia</i> )	Meadowsweet, Broad-leaf	SPIALBL	Rosaceae	FACW	S
	<i>Spiraea tomentosa</i>	Steeplebush	SPITOM	Rosaceae	FACW	S
	<i>Swida</i> (= <i>Cornus</i> ) <i>amomum</i>	Dogwood, Silky	SWIAMO	Cornaceae	FACW	S
	<i>Symphotrichum</i> (= <i>Aster</i> ) <i>cordifolium</i>	Aster, Heart-leaved	SYMCOR	Asteraceae	UPL	H
	<i>Symphotrichum</i> (= <i>Aster</i> ) <i>lanceolatum</i> ssp. <i>lanceolatum</i>	Aster, Panicked	SYMLAN	Asteraceae	FACW	H
	<i>Symphotrichum</i> (= <i>Aster</i> ) <i>lateriflorum</i>	Aster, Calico	SYMLAT	Asteraceae	FAC	H
	<i>Symphotrichum</i> (= <i>Aster</i> ) <i>puniceum</i> var. <i>puniceum</i>	Aster, Swamp (Purple-stemmed)	SYMPUNP	Asteraceae	OBL	H
	<i>Taxus canadensis</i>	Yew, Canadian	TAXCAN	Taxaceae	FACU	S
	<i>Thalictrum pubescens</i> (= <i>T. polygamum</i> )	Meadow-rue, Tall	THAPUB	Ranunculaceae	FACW	H
	<i>Thelypteris palustris</i> var. <i>pubescens</i>	Fern, Marsh	THEPALP	Thelypteridaceae	FACW	F
	<i>Tiarella cordifolia</i> var. <i>cordifolia</i>	Foamflower	TIACORC	Saxifragaceae	FACU	H
	<i>Toxicodendron rydbergii</i>	Ivy, Poison	TOXRYD	Anacardiaceae	FAC	S
	<i>Triadenum virginicum</i> (= <i>Hypericum</i> v.)	St. Johnswort, Marsh	TRIVIR	Hypericaceae	OBL	H
*	<i>Trifolium arvense</i>	Clover, Rabbit-Foot	TRIARV	Fabaceae	UPL	H
*	<i>Trifolium pratense</i>	Clover, Red	TRIPRA	Fabaceae	FACU	H
	<i>Trillium undulatum</i>	Trillium, Painted	TRIUND	Melanthiaceae	FACU	H
	<i>Tsuga canadensis</i>	Hemlock, Eastern	TSUCAN	Pinaceae	FACU	T
*	<i>Tussilago farfara</i>	Coltsfoot	TUSFAR	Asteraceae	FACU	H
	<i>Typha latifolia</i>	Cattail, Broad-leaf	TYPLAT	Typhaceae	OBL	H
	<i>Ulmus americana</i>	Elm, American	ULMAME	Ulmaceae	FACW	T
	<i>Utricularia intermedia</i>	Bladderwort, Flat-leaf	UTRINT	Lentibulariaceae	OBL	H
	<i>Uvularia sessilifolia</i>	Bellwort, Sessile-leaf	UVUSES	Colchicaceae	FACU	H
	<i>Vaccinium angustifolium</i>	Blueberry, Lowbush	VACANG	Ericaceae	FACU	S
	<i>Vaccinium corymbosum</i>	Blueberry, Highbush	VACCOR	Ericaceae	FACW	S
	<i>Vaccinium macrocarpon</i>	Cranberry, Large	VACMAC	Ericaceae	OBL	S
	<i>Vaccinium myrtilloides</i>	Blueberry, Velvet leaf	VACMYR	Ericaceae	FACW	S
	<i>Veratrum viride</i>	False-hellebore, American	VERVIR	Melanthiaceae	FACW	H
*	<i>Verbascum thapsus</i>	Mullein, Common	VERTHA	Scrophulariaceae	UPL	H
*	<i>Veronica officinalis</i> var. <i>officinalis</i>	Speedwell, Common	VEROFFO	Plantaginaceae	FACU	H
	<i>Viburnum acerifolium</i>	Viburnum, Maple-Leaved	VIBACE	Adoxaceae	UPL	S
	<i>Viburnum dentatum</i> var. <i>lucidum</i> (= <i>V. recognitum</i> )	Arrowwood	VIBDEN	Adoxaceae	FAC	S
	<i>Viburnum lantanoides</i> (= <i>V. alnifolium</i> )	Hobblebush	VIBLAN	Adoxaceae	FACU	S
	<i>Viburnum nudum</i> (= <i>cassinoides</i> )	Witherod	VIBNUD	Adoxaceae	FACW	S
*	<i>Vicia cracca</i> ssp. <i>cracca</i>	Vetch, Cow or Tufted	VICCRA	Fabaceae	UPL	H
	<i>Viola cucullata</i>	Violet, Marsh Blue	VIOCUC	Violaceae	OBL	H
	<i>Viola pallens</i> (= <i>V. macloskeyi</i> ssp. <i>pallens</i> )	Violet, Northern White	VIOPAL	Violaceae	OBL	H
	<i>Viola sagittata</i> var. <i>ovata</i> (= <i>V. fimbriatula</i> )	Violet, Ovate-leaved	VIOSAGO	Violaceae	FAC	H
	<i>Viola sororia</i> (= <i>V. septentrionalis</i> )	Violet, Common Blue	VIOSOR	Violaceae	FAC	H
	<i>Vitis riparia</i>	Grape, River Bank	VITRIP	Vitaceae	FAC	WV

<b>WILDLIFE SPECIES of the Smith-Sargent Road Property, Holderness, NH</b>			
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	<b>Scientific Name</b>	<b>Common Name</b>	<b>Observational Sign</b>
<b>Mammals</b>			
	<i>Blarina brevicauda</i>	Short-tailed shrew	tracks, odor
	<i>Lepus americanus</i>	Snowshoe hare	tracks, browse, scat
	<i>Tamias striatus</i>	Eastern chipmunk	sighting, chew marks, tunnels, tracks
	<i>Sciurus carolinensis</i>	Gray Squirrel	sighting, chew marks, tracks
	<i>Tamiasciurus hudsonicus</i>	Red squirrel	sighting, chew marks, tunnels, tracks
	<i>Glaucomys sp.</i>	Flying Squirrel	tracks
	<i>Castor canadensis</i>	Beaver	tracks, lodge, dam, browse
	<i>Peromyscus maniculatus</i> <sup>^</sup>	Deer mouse	tracks, tunnels, chew marks
	<i>Clethrionomys gapperi</i>	Red-backed vole	tracks, tunnels, scat
	<i>Microtus pennsylvanicus</i>	Meadow vole	tracks, tunnels
	<i>Ondatra zibethicus</i>	Muskrat	scat
	<i>Canis latrans var.</i>	Eastern coyote	tracks, scat
	<i>Vulpes vulpes</i>	Red fox	tracks, scent
	<i>Urocyon cinereoargenteus</i>	Gray Fox	tracks
	<i>Ursus americanus</i>	Black bear	tracks through wetland
	<i>Procyon lotor</i>	Raccoon	tracks, scat
	<i>Mustela erminea</i>	Short-tailed weasel or ermine	tracks in snow
	<i>Mustela vison</i>	Mink	tracks in sand, snow
	<i>Mephitis mephitis</i>	Striped skunk	tracks in mud
	<i>Lutra canadensis</i>	River Otter	possible track
	<i>Lynx rufus</i>	Bobcat	scat
	<i>Odocoileus virginianus</i>	White-tailed deer	sighting, tracks, browse, beds, scat
<b>Birds</b>	<b>[Includes Probable Species]</b>		<b>Number of Individual Sightings</b>
	<i>Ardea herodias</i>	<b>Great Blue Heron</b>	
	<i>Branta canadensis</i>	<b>Canada Goose</b>	
	<i>Aix sponsa</i>	<b>Wood Duck</b>	
	<i>Anas rubripes</i>	<b>American Black Duck</b>	
	<i>Anas platyrhynchos</i>	<b>Mallard</b>	
	<i>Lophodytes cucullatus</i>	<b>Hooded Merganser</b>	
	<i>Cathartes aura</i>	<b>Turkey Vulture</b>	1
	<i>Buteo platypterus</i>	<b>Broad-winged Hawk</b>	1
	<i>Falco sparverius</i>	<b>American Kestrel</b>	1
	<i>Bonasa umbellus</i>	<b>Ruffed Grouse</b>	1
	<i>Meleagris gallopavo</i>	<b>Wild Turkey</b>	5
	<i>Scolopax minor</i>	<b>American Woodcock</b>	
	<i>Zenaida macroura</i>	<b>Mourning Dove</b>	1
	<i>Strix varia</i>	<b>Barred Owl</b>	(off site)
	<i>Archilochus colubris</i>	<b>Ruby-throated Hummingbird</b>	
	<i>Ceryle alcyon</i>	<b>Belted Kingfisher</b>	
	<i>Sphyrapicus varius</i>	<b>Yellow-bellied Sapsucker</b>	2
	<i>Picoides pubescens</i>	<b>Downy Woodpecker</b>	1
	<i>Picoides villosus</i>	<b>Hairy Woodpecker</b>	1
	<i>Colaptes auratus</i>	<b>Northern Flicker</b>	
	<i>Dryocopus pileatus</i>	<b>Pileated Woodpecker</b>	(off site)
	<i>Contopus virens</i>	<b>Eastern Wood-Pewee</b>	1
	<i>Empidonax alnorum</i>	<b>Alder Flycatcher</b>	
	<i>Empidonax minimus</i>	<b>Least Flycatcher</b>	1
	<i>Sayornis phoebe</i>	<b>Eastern Phoebe</b>	2
	<i>Myiarchus crinitus</i>	<b>Great Crested Flycatcher</b>	(off site)
	<i>Tyrannus tyrannus</i>	<b>Eastern Kingbird</b>	1
	<i>Vireo olivaceus</i>	<b>Red-eyed Vireo</b>	1
	<i>Cyanocitta cristata</i>	<b>Blue Jay</b>	5
	<i>Corvus brachyrhynchos</i>	<b>American Crow</b>	3
	<i>Corvus corax</i>	<b>Common Raven</b>	2
	<i>Tachycineta bicolor</i>	<b>Tree Swallow</b>	1
	<i>Poecile atricapillus</i>	<b>Black-capped Chickadee</b>	6
	<i>Baeolophus bicolor</i>	<b>Tufted Titmouse</b>	1
	<i>Sitta canadensis</i>	<b>Red-breasted Nuthatch</b>	(off site)
	<i>Sitta carolinensis</i>	<b>White-breasted Nuthatch</b>	4
	<i>Certhia americana</i>	<b>Brown Creeper</b>	
	<i>Troglodytes troglodytes</i>	<b>Winter Wren</b>	2
	<i>Regulus calendula</i>	<b>Ruby-crowned Kinglet</b>	1
	<i>Catharus fuscescens</i>	<b>Veery</b>	1
	<i>Catharus guttatus</i>	<b>Hermit Thrush</b>	1
	<i>Turdus migratorius</i>	<b>American Robin</b>	1
	<i>Dumetella carolinensis</i>	<b>Gray Catbird</b>	2
	<i>Bombycilla cedrorum</i>	<b>Cedar Waxwing</b>	1
	<i>Vermivora ruficapilla</i>	<b>Nashville Warbler</b>	
	<i>Parula americana</i>	<b>Northern Parula</b>	(off site)
	<i>Dendroica petechia</i>	<b>Yellow Warbler</b>	1

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	<b>Scientific Name</b>	<b>Common Name</b>	<b>Observational Sign</b>
	<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler	1
	<i>Dendroica magnolia</i>	Magnolia Warbler	
	<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	(off site)
	<i>Dendroica coronata</i>	Myrtle Warbler	4
	<i>Dendroica virens</i>	Black-throated Green Warbler	(off site)
	<i>Dendroica fusca</i>	Blackburnian Warbler	1
	<i>Dendroica pinus</i>	Pine Warbler	1
	<i>Mniotilta varia</i>	Black-and-white Warbler	1
	<i>Setophaga ruticilla</i>	American Redstart	
	<i>Seiurus aurocapillus</i>	Ovenbird	2
	<i>Seiurus noveboracensis</i>	Northern Waterthrush	
	<i>Geothlypis trichas</i>	Common Yellowthroat	3
	<i>Wilsonia canadensis</i>	Canada Warbler	
	<i>Piranga olivacea</i>	Scarlet Tanager	(off site)
	<i>Melospiza melodia</i>	Song Sparrow	3
	<i>Melospiza georgiana</i>	Swamp Sparrow	1
	<i>Zonotrichia albicollis</i>	White-throated Sparrow	2
	<i>Junco hyemalis</i>	Slate-colored Junco	2
	<i>Cardinalis cardinalis</i>	Northern Cardinal	(off site)
	<i>Passerina cyanea</i>	Indigo Bunting	
	<i>Agelaius phoeniceus</i>	Red-winged Blackbird	1
	<i>Quiscalus quiscula</i>	Common Grackle	
	<i>Carpodacus purpureus</i>	Purple Finch	1
	<i>Carduelis tristis</i>	American Goldfinch	1
<b>Amphibians</b>			
	<i>Ambystoma maculatum</i>	spotted salamander	eggs
	<i>Notophthalmus viridescens</i>	red-spotted newt	juveniles (eggs), adults
	<i>Plethodon cinereus</i>	redback salamander	adult
	<i>Anaxyrus americanus</i>	eastern American toad	sub-adult
	<i>Pseudacris crucifer</i>	northern spring peeper	adults
	<i>Hyla versicolor</i>	gray treefrog	adults
	<i>Lithobates clamitans</i>	green frog	tadpoles, adults
	<i>Lithobates sylvatica</i>	wood frog	juvenile
	<i>Lithobates palustris</i>	pickereel frog	adult
<b>Reptiles</b>			
	<i>Chelydra serpentina serpentina</i>	snapping turtle	tracks through mud
	<i>Chrysemys picta picta</i>	eastern painted turtle	adult (photo)
	<i>Thamnophis sirtalis sirtalis</i>	eastern garter snake	adult
<b>Fish</b>			
	<i>Salvelinus fontinalis</i>	E. brook trout	juvenile
	<i>Rhinichthys atratulus</i>	Blacknose dace	juveniles, adults
<b>Invertebrates</b>			
	<i>Lumbricus rubellus</i>	earth worm	castings
	<i>Arion subfuscus</i>	dusky arion slug	visual obs.
	Geophilidae	geophilid millipede	visual obs.
	<i>Dermacentor variabilis</i>	American dog (wood) tick	picked off clothing
	<i>Ixodes scapularis</i>	black-legged (deer) tick	picked off clothing
	<i>Araneus</i> sp.	orb weaver spider	visual obs.
	<i>Araneus nordmanni</i>	Nordman's orb weaver	visual obs.
	<i>Tetragnatha</i> sp.	long-jawed spider	photo
	<i>Dolomedes triton</i>	six-spotted fishing spider	visual obs.
	<i>Lycosa gulosa</i>	forest wolf spider	visual obs.
	<i>Podura aquatica</i>	pond springtail	visual obs.
	<i>Argia fumipennis</i>	variable dancer	visual obs.
	<i>Chromagrion conditum</i>	aurora damsel	photo
	<i>Enallagma</i> sp.	bluet damselfly	probably ebrium (photo)
	<i>Enallagma</i> sp.	bluet damselfly	probably cyathigerum (photo)
	<i>Ischnura verticalis</i>	eastern forktail damselfly	visual obs.
	<i>Nehalennia irene</i>	sedge sprite	visual obs.
	<i>Aeshna tuberculifera</i>	black-tipped darner	visual obs.
	<i>Aeshna verticalis</i>	green-striped darner	visual obs.
	<i>Anax junius</i>	green darner	visual obs.
	<i>Cordulia shurtleffi</i>	American emerald	visual obs.
	<i>Gomphus borealis</i>	beaverpond baskettail	photo
	<i>Cordulegaster maculata</i>	twin-spotted spiketail	coll. Exuvia
	<i>Ladona julia</i>	chalk-fronted corporal	visual obs.
	<i>Plathemis lydia</i>	common whitetail	photo
	<i>Leucorhinnia hudsonicus</i>	Hudsonian whiteface	visual obs.
	<i>Leucorhinnia frigida</i>	frosted whiteface	photo
	<i>Libellula cyanea</i>	spangled skimmer	photo
	<i>Libellula incesta</i>	slaty skimmer	visual obs.

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	<b>Scientific Name</b>	<b>Common Name</b>	<b>Observational Sign</b>
	<i>Libellula pulchella</i>	twelve-spotted skimmer	photo
	<i>Libellula quadrimaculata</i>	four-spotted skimmer	photo
	<i>Libellula semifasciata</i>	painted skimmer	photo
	<i>Sympetrum vicinum</i>	autumn meadowhawk	visual obs.
	<i>Taeniopteryx</i> sp.	winter stonefly	visual obs.
	<i>Melanoplus bivittatus</i>	two-lined grasshopper	visual obs.
	<i>Gryllus pennsylvanicus</i>	fall cricket	aural obs.
	<i>Philaenus spumarius</i>	meadow spittlebug	visual obs.
	<i>Graphocephala coccinea</i>	rainbow leafhopper	visual obs.
	<i>Papilio canadensis</i>	Canadian tiger swallowtail	visual obs.
	<i>Elophila icciusalis</i>	pondside pyralid moth	photo
	<i>Ectropis crepuscularia</i>	small engrailed moth	visual obs.
	<i>Probole alienaria</i>	dogwood geometer moth	visual obs.
	<i>Malacosoma disstria</i>	forest tent caterpillar moth	visual obs.
	<i>Cenocorixia</i> sp.	water boatman	visual obs.
	<i>Prociphilus tessellatus</i>	woolly alder aphid	visual obs.
	<i>Cicindela repanda</i>	bronze tiger beetle	visual obs.
	<i>Dineutus</i> sp.	small whirligig beetle	visual obs.
	<i>Gyrinus</i> sp.	large whirligig beetle	visual obs.
	<i>Staphylinus</i> sp.	large rove beetle	visual obs.
	<i>Serica</i> sp.	small june beetle	visual obs.
	<i>Mycetophagus</i> sp.	hairy fungus beetle	visual obs.
	<i>Harmonia axyridis</i>	asian ladybird beetle	visual obs.
	<i>Altica ambiens</i>	alder flea beetle	alder leaf damage - photo
	<i>Bittacomorpha</i> sp.	phantom crane fly	visual obs.
	<i>Tipula paludosa</i>	European crane fly	photo
	<i>Chrysops vittatus</i>	deer fly	visual obs.
	<i>Laphria</i> sp.	robber fly	photo
	<i>Rhagio mystaceus</i>	snipe fly	visual obs.
	<i>Rhabdophaga strobiloides</i>	willow gall fly	willow gall presence
	<i>Metasyrphus americanus</i>	American hover fly	visual obs.
	<i>Musca domestica</i>	house fly	visual obs.
	<i>Calliphora vomitoria</i>	blue bottle fly	visual obs.
	<i>Eurosta solidaginis</i>	goldenrod gall fly	gall obs.
	<i>Formica</i> sp.	mound ant	visual obs.
	<i>Camponotus pennsylvanicus</i>	black carpenter ant	visual obs.
	<i>Ammophila</i> sp.	thread-waisted wasp	photo
	<i>Vespa maculifrons</i>	eastern yellowjacket	visual obs.
	<i>Andrena</i> sp.	andrenid bee	visual obs.
	<i>Pompilus</i> sp.	spider wasp	visual obs.
	<i>Apis mellifera</i>	honey bee	visual obs.
	<i>Bombus griseocollis</i>	bumblebee	visual obs.
<b>Fungi</b>	<i>Amanita citrina</i>	citron amanita	visual obs.
	<i>Amanita muscaria</i>	fly agaric	visual obs.
	<i>Bisporella citrina</i>	yellow fairy cups	visual obs.
	<i>Cerrena unicolor</i>	mossy maple polypore	visual obs.
	<i>Clitocybe clavipes</i>	fat-footed clitocybe	visual obs.
	<i>Cortinarius anomalus</i>	banded cort	photo
	<i>Cortinarius lilacinus</i>	lilac cort	visual obs.
	<i>Cortinarius brunneus</i>	brown cort	visual obs.
	<i>Daedaleopsis confragosa</i>	thin maze polypore	visual obs.
	<i>Fomes fomentarius</i>	tinder polypore	visual obs.
	<i>Fomitopsis pinicola</i>	red-belted conk	visual obs.
	<i>Ganoderma applanatum</i>	artist's conk	visual obs.
	<i>Ganoderma tsugae</i>	hemlock varnish shelf	visual obs.
	<i>Inocybe</i> sp.	<i>Inocybe</i> sp.	visual obs.
	<i>Lactarius subserifluus</i>	scant-milk milky	visual obs.
	<i>Leccinum scabrum</i>	common scaber-stalk	visual obs.
	<i>Multiclavula mucida</i>	mossy lichen spears	photo
	<i>Piptoporus betulinus</i>	birch polypore	visual obs.
	<i>Russula fulvescens</i>	yellow russula	visual obs.
	<i>Stereum rameale</i>	crowded parchment	visual obs.
	<i>Suillus acidus</i>	acid-slime suillus	visual obs.
	<i>Trametes versicolor</i>	turkey-tails	visual obs.
	<i>Trichaptum biforme</i>	violet-tooth polypore	visual obs.
	<i>Tyromyces chioneus</i>	cheese polypore	visual obs.



# Mammal Track Transect Summary

Smith-Sargent Property- Winter 2015 - 2016

