



Natural Resource Inventory Greensboro Ridge Natural Area Hanover, New Hampshire

SUMMARY October 2011

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Methodology

- Preliminary GIS and Existing Data
 - GRANIT data- UNH Complex Systems Research Center
 - USGS topographic maps (digital raster graphic - historic and most recent)
 - NRCS soils data
 - National Agricultural Imagery Program 1992, 2003, & 2009
 - U.S. Fish and Wildlife National Wetland Inventory data
 - Stonehouse Mountain Mapping
 - New Hampshire Natural Heritage Bureau data
 - Botanical Survey Field Work report by Alice Schori, 2001
- Fieldwork: February 24, 2011, May 19, 2011, July 25, 2011
 - Winter – focus on wildlife species sign (tracks, scat, feeding, denning, etc.) and habitat types
 - Spring – focus on vernal pools, wildlife sign, bird species, habitat communities, wetlands, and vegetation
 - Summer – focus on plant species, forest health and habitat types, wildlife sign and presence, wetlands and drainage.
 - GPS locations – using a Garmin GPSmap 76CSx, WAAS enabled (not survey accurate)
 - Photography with digital cameras
 - Field book notes and documentation

Results

Habitat Types

Wetlands

Edge habitats around wetlands are frequently used by a great variety of wildlife. It is estimated that riparian (streamside) areas and wetlands are used by over 90% of the region's wildlife and are preferred habitat for over 40%. Throughout the Greensboro Ridge property, just over 10 acres (9%) of wetlands were documented. The wetland types varied greatly and included the following:

1. Palustrine Forested Wetlands
2. Palustrine Scrub Shrub Wetlands
3. Palustrine Emergent Wetlands

4. Open water including vernal pools
5. Riverine Upper Perennial Streams
6. Riverine Intermittent Streams (high water runoff and snow melt)

A few of the larger wetland complexes found are described below:

- Hemlock forested wetlands On this property, they flow primarily south. These wetland complexes offer excellent dense softwood habitat with a thick canopy and very little undergrowth.
- Red Maple-Black Ash-Swamp saxifrage swamp - An abundance of the swamp saxifrage (*Saxifraga pensylvanica*) in bloom was documented in this area on May 19, 2011. Black ash (*Fraxinus nigra*) and yellow birch (*Betula alleghaniensis*) were documented along with red maple (*Acer rubrum*). This wetland is found in the western portion of the Greensboro Ridge Natural Area and is 0.87 acres.



- Shrub/Scrub, open water/emergent headwater basin wetland – found in the northern part of the property. This wetland is best described as a hybrid bog/fen system. There is no defined inlet but a defined outlet flows intermittently serving as a headwater supply to a small perennial stream. Adjacent to this wetland are crevasses, some large enough to be more like caves. They were explored on February 24, 2011 when the wetland was frozen and could be crossed wearing snowshoes. The caves contained many potential den sites.

Yellow spotted salamander (*Ambystoma maculatum*) egg masses, wood frog (*Rana sylvatica*) tadpoles, and green frogs (*Rana clamitans melanota*) were observed in open water along the entire length of this wetland, confirming its function as a vernal pool, on May 19, 2011. Red spotted salamander (*Notophthalmus viridescens viridescens*) newts and adult wood frogs were documented. Blue Flag (*Iris versicolor*), cinnamon fern (*Osmunda cinnamomea*), sphagnum mosses (*Sphagnum spp.*), meadowsweet (*Spiraea latifolia*), and red maple (*Acer rubrum*) were the dominant plant species found. A porcupine (*Erethizon dorsatum*) carcass was found, suggesting predation sometime in the previous winter months. Additional plant species were documented during a site visit on July 25, 2011 and include: service berry (*Amelanchier spp.*), yellow birch (*Betula lutea*), wet aster sp., gold thread (*Coptis groenlandica*), royal fern (*Osmunda regalis*), wool grass (*Scirpus cyperinus*), red oak (*Quercus rubra*), New York fern (*Thelypteris noveboracensis*), bedstraw (cleaver) (*Galium aparine*), northern bugleweed (*Lycopus uniflorus*), gray birch (*Betula populifolia*), bur-reed (*Sparganium spp.*), yellow sedge (*Carex flava*), shallow sedge (*C. lurida*), marsh St. Johnswort (*Hypericum virginicum*), and interrupted fern (*Osmunda claytoniana*). The uniqueness of this wetland in this higher elevation area is evident with its broad diversity of plant and animal species and its location among dense softwood and northern hardwood forests.

Vernal Pools

Vernal pools provide essential breeding habitat for certain amphibians and invertebrates such as wood frogs (*Rana sylvatica*), yellow spotted salamanders (*Ambystoma maculatum*), marbled salamanders (*A. opacum*), and fairy shrimp (*Branchinecta lynchi*). These species depend on vernal pools as breeding sites, because these mostly temporary water bodies, thus devoid of fish and other aquatic predators. Reptiles such as Blanding's

turtles (*Emydoidea blandingi*) and spotted turtles (*Clemmys guttata*) also rely on vernal pools as important feeding areas in early spring. Vernal pools fill annually from precipitation, runoff, and rising groundwater, typically in the spring and fall. By mid-summer, however, these wetlands are typically dry, making them a dynamic system habitable to specifically adapted plant and wildlife species.

Several vernal pools were documented throughout the Greensboro Ridge Natural Area. Although some were isolated pools, many were associated with a larger wetland complex found in the northern part of the property.



“Text book” vernal pool found along the southern boundary of Greensboro Ridge Natural Area

Perennial and Intermittent Streams

The Greensboro Ridge Natural Area contains headwaters and small sub-watersheds with associated riparian zones and floodplains. These areas are important for most wildlife, many plant species, and water quality, particularly for downstream receiving waters. The Greensboro Ridge Natural Area contains three drainages that form two perennial and one intermittent stream running roughly north to south. During field work for this project, tracks of animals such as fisher, mink, and raccoon were documented travelling along these drainages and streams. They are all well shaded, which helps to keep water temperatures cool during the summer months.



An upper perennial stream which begins on the Greensboro Ridge Natural Area. It is well shaded, cool, and an important part of this ecosystem.

Dense Softwood

Dense softwood is the largest habitat type found throughout the Greensboro Ridge Natural Area. Of over 112 acres, nearly 47 acres or 41.9% of the area contains dense softwood stands. Eastern hemlock (*Tsuga canadensis*) is the primary species with some balsam fir (*Abies balsamea*) and white pine (*Pinus strobus*). Winter field work confirmed that white tail deer use these hemlock stands in the winter. There are extensive networks of deer trails as well as bedding sites and feeding areas. In some areas, the deer were feeding on acorns from scattered oak trees within the stand. Dense softwood stands are important deer wintering areas, which cover only about 3% of the land base in New Hampshire.

Northern Hardwood Forest

Just over 17 acres or 15.3% of the property contains northern hardwood dominated stands. The largest four areas are found in the northeastern, central and western portions of the property. Common tree species documented in the hardwood stands include: white ash (*Fraxinus americana*), white birch (*Betula papyrifera*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), aspen (*Populus tremuloides*), and beech (*Fagus grandifolia*). Less common species observed and scattered throughout the hardwood stands were black cherry (*Prunus serotina*), ironwood (*Carpinus caroliniana*), hornbeam (*Ostrya virginiana*), and basswood (*Tilia americana*).

Many of the trees in the northern hardwood stand as well as mixedwood forest are mature specimens producing abundant supplies of mast, particularly beech nuts and acorns. Although there are trees old enough to produce nuts and berries throughout the property, the northern hardwood stands contained the most mature individuals:



1. Most trees in the stands have large diameters over 12" DBH
2. The open, mature hardwood stands show relatively less undergrowth compared to other, younger hardwood and mixedwood stands
3. There was abundant bear sign on and around the trees

Mature hardwood stands containing mast-producing beech and oak trees are very important for wildlife in the fall, when the nuts are a critical source of protein and fats. Black bear rely on nuts in the fall as they store up fats and protein. During field work it was evident that these mast trees were well used by many wildlife species including mammals and birds (black bear, white tailed deer, squirrels, mice, wild turkey, ruffed grouse).

Mixedwood Stands

A large portion of the property (38.2%) is a mixture of softwood and hardwood species interspersed throughout approximately 43 acres. The mixedwood timber type is a result of the soils, slopes, aspect, wetlands, and past land use. Dominant tree species within these stands include: sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), beech (*Fagus grandifolia*), red oak (*Quercus rubra*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), and balsam fir (*Abies balsamea*). Although mixedwood stands are found throughout the property, the largest contiguous section occurs in the eastern portion of Greensboro Ridge Natural Area.

Rock Outcrops

Scattered throughout the property are several rock outcrop ridges. These ridges generally run in a north/south direction and are especially found among the dense softwood stands. The majority of the property has been mapped as Cardigan-Kearsarge Rock Outcrop Complex.

During field visits in May and July several colonies of maidenhair fern and blue cohosh were noted, often at the base of rock outcrops. They indicate that the pH is higher and the soil more suitable for species preferring rich, forest soils. The rock outcrops may contain calcium deposits that are slowly leaching into the soils through natural weathering.

Permanent Openings

As the percentage of permanent openings in New Hampshire has decreased significantly over the past 50 years, the State is encouraging landowners to create or maintain openings as important wildlife habitat. Permanent openings dominated by grasses, forbs, brambles, and fruiting shrubs provide necessary habitat for about 22% of New England's wildlife species, and are seasonally important habitat to nearly 70% of species.

The Greensboro Ridge Natural Area contains 3.24 acres or 2.9% permanent openings. These were originally cleared for house-sites, before the land was donated to the Hanover Conservancy. The permanent openings are all located in the southern part of the property and are adjacent to a variety of habitat types including wetlands, dense softwood stands, northern hardwoods and mixedwood stands. Although they cover only a small percentage of the total property, these openings create a diversity of habitat that will attract a variety of wildlife species.

