

# Danville Town Forest Stewardship Plan

Draft B

## Table of Contents (draft)

**Chapter 1 Introduction ..... 2**

- Purpose of the Stewardship Plan..... 2
- Location of the Danville Town Forest ..... 2
- Town Forest Boundaries ..... 3
- History of the Town Forest ..... 3
- Tuckertown Road ..... 5
- Danville Historic District ..... 5
- Surrounding Land Use and Ownership Patterns ..... 6
- Public Service of New Hampshire Easement ..... 6
- Proposed Conservation Easement .....6

**Chapter 2 Ecological Setting and Existing Features ..... 7**

- Introduction ..... 7
- Unfragmented Landscape ..... 7
- Soils and Topography ..... 10
- Watersheds, Wetland Systems, and Water Resources ..... 12
- Upland Habitats ..... 13
- Wildlife and their Habitats ..... 14
- Rare Plants, Exemplary Plant Communities, and Threatened and Endangered Wildlife ..... 20
- Invasive Species..... 20
- Public Uses, Trails, Cultural Features ..... 21

**Chapter 3 Stewardship Goals and Objectives**

**Chapter 4 Stewardship Issues and Recommendations**

**Maps**

- Map 1 Aerial Photo
- Map 2 Trails and Cultural Features
- Map 3 Conservation Lands
- Map 4 Topography
- Map 5 Soils
- Map 6 Water Resources
- Map 7 Habitats

**References**

**Appendices**

- Appendix A Proposed Conservation Easement Deed for Danville Town Forest
- Appendix B Plan of Land, Danville Town Forest, March 2006, Doucet Survey, Inc.
- Appendix C Danville Historic District Overlay and Historic District Ordinance
- Appendix D Plants and Animals Documented on the Danville Town Forest

## Chapter 1 Introduction

### Purpose of the Stewardship Plan

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As a community resource the Town Forest offers many benefits and values to residents and visitors. The Forest provides wildlife habitat, scenic beauty, clean air, cool temperatures, hiking trails and other outdoor recreation, wood products, water supply protection, flood storage, historical artifacts, among others. People value the Town Forest for many different reasons. Fortunately, most of these are complementary benefits, each available without compromising the integrity of the others.

A goal of this Stewardship Plan is to understand and appreciate the values of the Town Forest and to guide the use and management of these resources over time. This is achieved by identifying the known soils, topography, plants, animals, habitats, forests, waterways, historical artifacts, and public uses that occur on the Town Forest. The surrounding landscape, including ownership patterns, affects the Town Forest, and therefore can influence stewardship decisions. Past, present, and potential future natural and human disturbances are also an important factor in guiding long-term stewardship. The Stewardship Plan builds an understanding of the relationship among these features and factors.

Another purpose of the Stewardship Plan is to meet the provisions of a proposed conservation easement on the Town Forest. The Town of Danville is working with New Hampshire Audubon to convey an easement on a majority of the Town Forest to that organization. The draft conservation easement deed requires that all activities on the Town Forest be conducted in accordance with a Stewardship Plan. The specifics of the conservation easement deed are described in more detail below (see page 6-7) and a copy of the draft easement deed is in Appendix A.

A grant from the New Hampshire Estuaries Project (NHEP) Community Technical Assistance Program provided funding to complete this Stewardship Plan. NHEP contracted with Ibis Wildlife Consulting to prepare the Plan, working with the Danville Forestry Committee, Conservation Commission, Heritage Commission and Selectmen, as well as staff from the NHEP and New Hampshire Audubon (Audubon).

Many people through participation in the abovementioned committees contributed information and ideas to the Plan. Existing plans, studies and other documents provided valuable information about the Town Forest.

### Location

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The 420+acre Danville Town Forest is located in the northwest section of Danville, just to the north of the center of town. Most of the Town Forest lies to the west of Route 111A (Main Street); a disjunct 20-acre portion lies to the east of Rte 111A with access off Happy Hollow Road (Map 1). The Town Forest has approximately 2,583 feet of frontage along Rte 111A, a major north-south road through Danville. A small dirt parking lot is accessible off Rte 111A, xx miles south of Tuckertown Road. The parking lot hosts a kiosk and provides access to a trail network. Tuckertown Road is a gated Class A trail and designated scenic road that bisects the Town Forest, extending from Rte 111A west to the Town of Sandown. A Public Service of New Hampshire (PSNH) utility easement runs northwest/southeast through the western section of the Town Forest.

## **Town Forest Boundaries**

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The Danville Town Forest comprises more than a dozen different lots of record, some acquired through tax deeds. Old tax deeds are often thin in their legal descriptions, which can lead to confusion about the precise boundaries of a parcel. In anticipation of conveying a conservation easement on the Town Forest, the Town hired Doucet Survey, Inc. of Newmarket, New Hampshire to complete the deed research and survey the entire boundary. Doucet completed the survey on March 12, 2006; the Town recorded the survey at the Rockingham County Registry of Deeds on October 27, 2006 as Plan D-34246. A copy of this survey is included in Appendix B. The Doucet survey was used by Ibis Wildlife Consulting to create the boundary for the Stewardship Plan maps.

## **History of the Town Forest**

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New Hampshire statute gives towns and cities the ability to establish a Town Forest with a main purpose “to encourage the proper management of timber, firewood and other natural resources through planting, timber stand improvement, thinning, harvesting, reforestation, and other multiple use programs consistent with the forest management program, any deed restrictions and any pertinent local ordinances or regulations (RSA 31:111).

In 2000, the Danville Board of Selectmen appointed a Forestry Committee of three members as authorized in RSA 31:110-112 to oversee the management of the town forest. In 2001, residents voted to officially designate over 400 acres of land as Town Forest and to establish a Town Forest Maintenance Fund.

In 2002, the Forestry Committee hired Charles Moreno, a licensed consulting forester, to prepare a Forest Management Plan (FMP) for the Danville Town Forest. The FMP contains important information about the forest types, wetlands, and other features of the Town Forest.

One outcome of the forest management planning process was to re-affirm the protection of wildlife habitat, particularly the extensive wetlands, as a high priority on the Town Forest. In 2003, the Town voted to convey a conservation easement on the Town Forest to a conservation organization, to ensure the permanent protection of the Town Forest as open space to be managed for multiple conservation benefits, including wildlife habitat, watershed protection, recreation, timber production, scenery, and natural area preservation.

The Town decided to work with New Hampshire Audubon on the conservation easement, given that organization’s dedication to the conservation of wildlife and habitat throughout the state. The Conservation Commission also gathered feedback from the NH Fish and Game Department on ways to inventory and protect wildlife and their habitats on the Town Forest, particularly in light of the recently completed NH Wildlife Action Plan.

## **The Town Forest Lots**

In 1951, the Town voted to designate two parcels of land as “Town Forest.” Only one of those, the “Peaslee” lot remains as part of the Town Forest. The history of the Danville Town Forest begins as early as 1700, when Danville was within the original boundaries of the Town of Kingston. In 1694, Kingston separated from Hampton, taking a portion of what was later to become Kingston, East Kingston, Danville, Sandown, and parts of Hampstead.

At a town meeting of the Kingston Proprietors on December 19, 1700 and on October 31, 1706 grants of 200 acres on the westerly side of town were given to various grantees. These 200-acre grants were 34 rods wide and three miles long. The western boundary went as far as Angle Pond (now Sandown); the northern boundary was Exeter (now Fremont) and the southern boundary Hampstead. The eastern boundary was essentially what is now Route 111A. When the boundary line was finally settled between Sandown and Danville, each town ended up with about one-half of the original 200-acre grants (34 rods wide by 1.5 miles long). Sandown became a separate parish in 1756 and Danville in 1760. At that time, Danville was known as the Parish of Hawke.

For each lot, the four corner boundary trees were marked on all four sides with the lot number. The Danville Town Forest of today (except for the portion that is east of Route 111A) lies in parts of the 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup>, and 16<sup>th</sup> lots as they were originally laid out in 1700 and 1706. Old deeds often refer to a parcel of land, for example, as “being part of the 12<sup>th</sup> lot in the 200 acre grants, so called...”. The sequential lot numbers began at the Fremont line as No. 1 through No. 45. Tuckertown Road lies between the 13<sup>th</sup> and 14<sup>th</sup> lots. It was laid out by the selectmen in 1766.

The two oldest Town Forest parcels are called the “parsonage” lands. They were acquired by deed in 1761 by the Parish of Hawke. The 55-acre parsonage parcel lies in part of the 12<sup>th</sup> lot in the division of the 200-acre grants. The 20-acre parsonage parcel is the disjunct parcel south of Happy Hollow Road. From 1790 to 1991 the parsonage land and Parsonage Fund were managed by a three person elected Parsonage Committee to carry out the intention of the deeds of 1761 that read “for the use of the Ministry forever.” The Parsonage Fund is no longer used for Ministry, but for the maintenance and preservation of the Meeting House, which is across the road from the Town Forest.

As in many towns, some of the current parcels within the Town Forest came through tax collector deeds, the land forfeited by the landowner. Table 1 shows the year and the reason for each of the parcels becoming part of the Town Forest, as well as the purpose of any income derived from each parcel.

**Table 1. History of acquisition of each parcel within the Danville Town Forest**

<b>Tax Map &amp; Lot #</b>	<b>Former Owner</b>	<b>How</b>	<b>Year</b>	<b>Income</b>
1-54/57	Parsonage land	Land swap	1761	Parsonage Fund
2-57	Parsonage land	Land swap	1761	Parsonage Fund
1-49	Mills & Heath	Tax deed	1933	Forest Fund
1-52	Peaslee land	Tax deed	1933	Forest Fund
1-53	Mary J. Sanborn	By will	1938	Churches
1-63	Mary J. Sanborn	By will	1938	North Library
1-60	Brown land	Tax deed	1941	Forest Fund
1-56	George land	Tax deed	1954	Forest Fund
1-68/69	West land	Tax deed	1954	Forest Fund
1-62	Great Meadow	Fee purchase	1999	Forest Fund

### **History of Land Use on the Town Forest**

By the mid-1800s, nearly 75 percent of central New England had been cleared for agriculture. Small woodlots remained intermingled with crops and pastures, as they were an important source of fuel for farmers. Whether farmed or logged, much of the landscape in southern New Hampshire, including Danville, was impacted by these landscape-scale changes. As farms in the region were abandoned in the late 1800s, for a better or different life elsewhere, the forests began to grow back, and by the 1970s New Hampshire was becoming mostly forested once again.

The ownership history and current condition of the Danville Town Forest reflects a similar pattern of land use over the past several hundred years. Records from the Parsonage indicate timber sales and farming dating back to the early 1800s. The last owner of the “Peaslee” lot was a lumber company, Mills & Heath, which abandoned the lot in the 1930s after it was cut over. The Town took possession of the parcel for unpaid taxes in 1933. A detailed forest type map of the two parsonage lands was drawn by the NH Forestry Department in December 1938 after the hurricane took many trees. In 1941 the hurricane lumber was sold and the proceeds were used to reforest. The first Town Forester on record was Dana Lessard. Melton Sanborn was the Town Forester from 1971 until his death in 1998. The Town of Danville Annual Reports include records of income from wood cut on the Town Forest.

*(Betsy Sanders, a resident of Danville and member of the Forestry Committee, provided information on history and town forest lots that make up the Danville Town Forest)*

### **Tuckertown Road**

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In 1953 Tuckertown Road (also known as Tucker Road) was closed by vote of Town Meeting. In 1973, Danville residents voted to designate Tuckertown Road as a *scenic road* under the provisions of RSA 253:17,18 and that the road shall remain closed and in an unimproved (unpaved) surface condition to protect the scenic and historic character of the road. Tuckertown Road was further designated a *Class A trail* in 1993. A gate was erected at the entrance off Rte 111A in 2004 to control access on the road. Tuckertown Road is used for recreation, including walking, nature observation, bicycling, motorized recreation, and snowshoeing (Map 2). It is an easy one+ mile walk from one end to other, although beavers have flooded the trail in the mid-section.

### **Danville Historic District**

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The purpose of the Danville Historic District is to safeguard the heritage of Danville by protecting historic structures and architectural history, foster appreciation of the town’s beauty and history, protect the town’s character and rural setting, and promote use of historic structures.

Through the efforts of the Danville Heritage Commission, a Historic District Ordinance was proposed and approved as a warrant article in March 1999 to provide for future protection of Tuckertown Road, town owned property north and south of the road, and the Old Meeting House and cemetery, and Ye Olde Cemetery.” A copy of the Danville Historic District Overlay and Historic District Ordinance is in Appendix C.

A portion of the Town Forest is within the Historic District. While at this time there is no known historic building foundations on the Town Forest, there are several stone walls within or along the boundaries of the Town Forest, a testament to past land use (Map 2).

The historic Hawke Meetinghouse is located directly across the road from the Town Forest and entrance to Tuckertown Road. The building is on the National Registry of Historic Places and is recognized as the oldest original construction meeting-house in New Hampshire. Just up the road on the opposite side is the “Ye Olde Cemetery,” adjacent to the Town Forest Parsonage land.

## **Surrounding Land Use and Ownership Patterns**

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The Danville Town Forest is bounded by Rt 111A along its eastern boundary. Residential subdivisions and the Colby Pond Recreation Area border the southern boundary; some of the houses abut the Great Meadow wetland. A large portion of the western boundary has a large, proposed subdivision that is pending approval. Another landowner, that is pursuing sand and gravel extraction, abuts the northwest corner of the Town Forest. The northern boundary of the Town Forest abuts large, forested private ownerships. The 45-acre Phyllis Massey Stafford Conservation Area is surrounded by Town Forest on three sides with frontage on Tuckertown Road and Rte 111A (Map 3). The Society for the Protection of New Hampshire Forests holds a conservation easement on the Stafford Conservation Area. The 20-acre parcel south of Happy Hollow Road is bordered on the west by privately owned forested parcels. The 60-acre ownership along the eastern boundary was heavily cut 5-6 years ago. A residential subdivision abuts the parcel to the south.

## **Public Service of New Hampshire Easement**

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In 1974, the Town of Danville granted an easement to Public Service of New Hampshire (PSNH) to maintain their utility line within a 280-foot wide corridor (see Rockingham County Registry of Deeds Book 2231 Page 1227). The easement allows PSNH to maintain the lines and associated structures and to manage the vegetation within the corridor. This linear feature through the Town Forest is used by recreational ATVs and supports a unique habitat not found elsewhere on the Town Forest.

## **Proposed Conservation Easement**

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Danville residents approved the placement of a conservation easement on the Town Forest by a warrant article in March 2003. The final easement deed is nearing completion with the combined efforts of the Conservation Commission, Forestry Committee, Heritage Commission and the Board of Selectmen (See Appendix A for a copy of the draft Easement Deed for the Town Forest). The conservation easement is proposed for all of the Town Forest, except the PSNH utility corridor and Tuckertown Road, which will be excluded from the conservation easement.

### *Conservation Easements*

A landowner has a bundle of rights to use and modify the property that they own. A conservation easement is a legal agreement between the landowner and a conservation organization, agency, or municipality that transfers some of these rights (typically the “development rights”) to the organization that holds the easement. Typically a conservation easement is granted in perpetuity and therefore the development rights are extinguished forever, preserving the land as open space. Each easement deed is crafted to fit the features of the property to be protected, the needs of the landowners, and the goals of the entity accepting the easement. Easements are used to provide permanent protection from subdivision or other development or uses that could degrade or destroy ecological, scenic, or other natural resources. Easements often provide for continued farming, forestry, wildlife management, and recreation. A landowner who conveys a conservation easement is the grantor and the recipient organization is the grantee.

The proposed conservation easement for the Danville Town Forest will protect the land in its entirety and in perpetuity as open space, preventing any residential and industrial development, commercial activities, and mining. Forestry and agriculture are allowed as well as wildlife habitat management, outdoor education, and outdoor recreation.

The Purposes of the draft conservation easement are to:

- conserve and manage wildlife habitats, wetlands and water resources, and ecological processes
- provide public access for low-impact outdoor recreation and education
- preserve and conserve cultural and historic resources
- provide for agricultural use of the soils of agricultural significance if desired
- retain in perpetuity for sustainable forestry
- retain the scenic quality

The draft easement deed details the stewardship goals for the Town Forest related to biological diversity and integrity, unique historic archeological and cultural features, outdoor recreation and education, sustainable source of forest products, forest health, soil productivity, native species and non-native invasive species, water quality protection, and conservation of wetlands, riparian areas and aquatic habitats.

## Chapter 2 Ecological Setting & Existing Features

### Introduction

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The Danville Town Forest lies within what is known as the Gulf of Maine Coastal Plain, an area of transitional forest or “tension zone” between the boreal forest to the north and hardwood forests to the south. New Hampshire’s Wildlife Action Plan places the Town Forest in a region of two broad forest types: Appalachian-Oak Forest and Hemlock-Hardwood-Pine Forest.<sup>1</sup> Within these broad “matrix forest” habitats are patches of other habitats including wetlands, streams, and other water bodies. Soils, topography, aspect, and disturbance patterns determine the dominant tree species and other plants that grow on a specific site.

The forested landscape in Danville and elsewhere in southeastern New Hampshire has experienced a variety of disturbance histories. Natural disturbances of these forests largely come from single-tree windthrow, with occasional larger blowdowns from hurricanes.<sup>2</sup> Beaver are also an important natural disturbance dynamic, particularly in the Town Forest with the extensive network of wetland systems. These forests have evolved for thousands of years with these natural disturbances. More “recent” disturbances include farming and farm abandonment, human settlements, logging, recreation, and introduced forest pathogens. A new, and perhaps more insidious disturbance, involves climate change, that has yet to fully express itself in changes to forest and wetland ecosystems in this region.

The current condition of the Danville Town Forest is an expression of the inherent site capability as well as past and present natural and human disturbances. This is a snapshot in time. Natural plant succession along with disturbance will continue to create change in the Town Forest.

Numerous sources of information were used to understand and describe the ecological setting and natural features of the Danville Town Forest. These sources included the following studies, surveys, and plans:

- Town of Danville, NH Natural Resources Inventory (1998)
- Forest Management Plan for the Danville Town Forest (2002)
- Wetland Inventory: Danville, New Hampshire (2002)
- Danville Town Reports and Ordinances
- Doucet Survey, Inc boundary survey of the Town Forest (2006)
- New Hampshire Wildlife Action Plan (2006)
- The Land Conservation Plan for New Hampshire’s Coastal Watershed (2006)
- Site visits by Ibis Wildlife Consulting (2008)

### Unfragmented Landscape

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Unfragmented forest blocks are large areas of habitat with few or no roads, houses, or other development. In southeastern New Hampshire, blocks of 1,000 acres or more are considered regionally significant and blocks of 500-1,000 acres may also be locally significant. A large unfragmented block of habitat typically has greater capacity to support interior forest species (e.g., scarlet tanager, wood thrush), greater ability to

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<sup>1</sup> New Hampshire Fish and Game Department. 2005. New Hampshire Wildlife Action Plan. Concord, NH.

<sup>2</sup> Sperduto, D.D., and W.F. Nichols. 2004. Natural Communities of New Hampshire. NH Natural Heritage Bureau, Concord, NH.

sustain natural processes, including resilience to natural disturbances, and often encompasses a diversity of habitats in close proximity to each other.

The New Hampshire Fish and Game Department (NHFG) identified development (residential, commercial, industrial) as one of the most significant risk factors to the State's wildlife and habitats (NHFG 2006). Development causes the fragmentation of habitat into small, unconnected parcels. Songbirds, small mammals, and other wildlife species are more susceptible to mid-sized predators such as fox, raccoon, and skunk in small blocks of habitat. These "generalist" predators adapt better than other species to a fragmented landscape. Habitat blocks crisscrossed with residential roads and houses expose wildlife to high rates of road mortality, increase conflicts with humans and pets, result in increased contaminated runoff, and offer more opportunities for invasive plants to spread to natural areas.

The Danville Town Forest is over 400 acres, and lies within a larger xxxx-acre unfragmented block of habitat. However, development pressures continue to shrink this unfragmented habitat and connectivity for wildlife to other unfragmented habitats in the region is diminishing. Thirty-five years ago the Town Forest was part of a 3600+ unfragmented habitat that extended to the Cub Ponds in Sandown; by 2002 the block had shrunk to 1,200+ acres (Moreno 2002). Placing a conservation easement on the Town Forest will ensure that this ownership remains unfragmented in perpetuity.

## Topography and Soils

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As shown on the topographic map (Map 4) the highest point on the Town Forest is 320-feet in the northeast corner atop the hill near the old cemetery. From there the land slopes to the southeast and southwest toward the major wetland drainages.

The factors that most determine the soil types found in southeastern New Hampshire are parent material and slope or topography<sup>3</sup>. The Danville Town Forest supports a diversity of soil types, formed from several different kinds of parent material: glacial till, glacial outwash, or organic material (see Table 2 and Map 5). Most of the Town Forest is considered either very stony or is wetland soils.

The well drained glacial till soils (Chatfield-Hollis-Canton complex, Canton, and Scituate-Newfields complex) are found on the hills, knolls, and ridges of the Town Forest. These are all considered productive forest soils. The Chatfield-Hollis-Canton (C-H-C) complex usually indicates shallow to bedrock conditions and is the most common soil type on the Town Forest. Canton soils are deeper and more productive than the C-H-C complex.

The glacial outwash soils form in the lower slopes and valleys, along streams and wetlands. These soils (Hinckley, Walpole, and Pipestone) vary in their drainage characteristics. The Hinckley fine sandy loam is excessively drained with fine sandy loam at the surface and gravelly coarse sand below, and is a productive forest soil. Walpole and pipestone are poorly drained and are found around some of the wetlands.

The final group of soils, derived from organic material, underlies the wetlands on the Town Forest. The pits, sand, and gravel soil type represents the small gravel pit along Tuckertown Road. It is characterized as such because the topsoil was removed.

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<sup>3</sup> United States Department of Agriculture Soil Conservation Service. 1994. Soil survey of Rockingham County, New Hampshire.

There are no prime farmland soils or soils of statewide importance for agriculture on the Town Forest. However one soil type--Canton gravelly fine sandy loam at 3-8% slopes (43B)--on the Town Forest is considered a farmland soil of local importance.

**Table 2. Soil Types on the Danville Town Forest (also see Map 5)**

Soil #	Soil Name	Acres	Drainage	Parent Material
<b>Wetland soils</b>				
295	Greenwood mucky peat	105	very poorly drained	organic
495	Ossipee mucky peat	12	very poorly drained	organic
125	Scarboro muck, very stony	10	very poorly drained	organic
395	Chocorua mucky peat	6	very poorly drained	organic
97	Greenwood and Ossipee soils, ponded	1	very poorly drained	organic
Subtotal		134		
<b>Upland soils</b>				
140C	Chatfield-Hollis-Canton complex	84	well-drained	glacial till
43C	Canton gravelly fine sandy loam	63	well-drained	glacial till
140B	Chatfield-Hollis-Canton complex	33	well-drained	glacial till
43B	Canton gravelly fine sandy loam	30	well-drained	glacial till
140D	Chatfield-Hollis-Canton complex	26	well-drained	glacial till
12B	Hinckley fine sandy loam	24	excessively drained	glacial outwash
314A	Pipestone sand	10	somewhat poorly drained	glacial outwash
547B	Walpole very fine sandy loam	8	poorly drained	glacial outwash
43D	Canton gravelly fine sandy loam	5	well-drained	glacial till
12C	Hinckley fine sandy loam	5	excessively drained	glacial outwash
447B	Scituate-Newfields complex	1	moderately well-drained	glacial till
12A	Hinckley fine sandy loam	<1	excessively drained	glacial outwash
298	Pits, sand, and gravel	<1		
Subtotal		289		

## Watersheds, Wetland Systems, and Water Resources

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### Watersheds

Danville lies within two regional watersheds. Twenty-six percent of the town falls within the Exeter River Watershed and the remainder (74%) falls within the Powwow River Watershed. Drainage from the northwest and west sections of the Town Forest flows north into the Exeter River Watershed, which eventually flows east into Great Bay. The southerly and eastern portion of the Town Forest drains south and encompasses a portion of the Powwow River headwaters, which eventually drains into the Merrimack River (Map 6).

### ***Upper Exeter River Conservation Focus Area***

In 2006, The Nature Conservancy, Society for the Protection of NH Forests, and the Rockingham and Strafford Regional Planning Commissions published *The Land Conservation Plan for New Hampshire's Coastal Watersheds* ("The Coastal Plan). New Hampshire's coastal watersheds span 990 square miles or approximately 633,000 acres and 46 towns, including part of Danville. The authors identified 75 Conservation Focus Areas that comprise over 190,000 acres or 36% of the coastal watersheds that are of exceptional significance for living resources and water quality. Each Conservation Focus Area comprises a Core Area that contains the primary natural features and habitat for which the focus area was identified. Some focus areas also include Supporting Natural Landscape, which is composed of natural lands that helps safeguard the Core Area while also providing habitat for many common species. The Danville Town Forest lies within one of the 75 Conservation Focus Area identified as Upper Exeter River and encompasses both Core Area and Supporting Natural Landscape (Map 7).

### **Wetland Systems**

A significant feature of the Danville Town Forest is the extensive network of wetlands that include large and small wetlands, vernal pools, perennial and intermittent streams (Map 6). Wetland soils comprise approximately 135 acres or 32 % of the Town Forest.

Freshwater wetlands are grouped into several general categories in New Hampshire: open water-emergent wetlands, scrub-shrub wetlands, forested wetlands, and peatlands. Emergent wetlands are marshes with a mix of open water, floating-leaved vegetation, and herbaceous growth in standing water. Shrubs such as speckled alder, silky dogwood, winterberry, sweet pepperbush, nannyberry, and typically a few saplings of red maple or other trees dominate the scrub-shrub wetlands. Forested wetlands are associated with slow-moving streams and beaver flowages and are typically inundated with water part of the year, and support trees, particularly red maple. Peatlands are a wetland type with low nutrient content and higher acidity caused by limited groundwater input and surface runoff.

Approximately 43 acres of the Town Forest are forested wetlands (Map 7). Red maple is the dominant overstory tree, although some are dominated by hemlock. Understory vegetation varies depending on the site and may include hemlock, yellow birch, American elm, white ash, black ash, and black gum (Moreno 2002). Forested wetlands typically have a diversity of understory shrubs and herbaceous plants along with abundant fallen trees and rotting stumps. Some forested wetlands are characterized as vernal pools.

The "Great Meadow" is a 56-acre wetland in the southeast corner of the Forest, with an active heron rookery, and is a prominent feature of the Town Forest. This large wetland and the other smaller wetlands located throughout the property are dynamic systems influenced by beaver activity. The importance of beaver to the wetland systems and associated wildlife is discussed in more detail below. These wetlands have open water areas that transition to emergent marsh then to scrub-shrub community and then to upland forest. The emergent marsh community includes duckweed, pond lily, and pickerelweed. Shrubs include winterberry, sweet pepperbush, highbush blueberry, and speckled alder. Standing dead trees interspersed in the open water are particularly evident in the Great Meadow. Perennial and intermittent (seasonal) streams connect many of the wetlands to one another, forming large wetland complexes.

Vernal pools are ephemeral wetlands that fill in spring from rainfall, snowmelt, or rising groundwater.<sup>45</sup> Some pools also fill in the fall after autumnal rains. These pools are typically small in size, ranging from less than 1/10<sup>th</sup> acre to more than 2 acres. Size, however, is not always an indicator of the quality or productivity of a vernal pool. Most vernal pools completely dry out by the end of summer and therefore can not support fish populations, which makes these pools safe for breeding amphibians such as wood frog, spotted and blue-spotted salamanders. The length of time that a pool retains water is known as its “hydroperiod.” Most vernal pool breeders need about four months to complete their reproductive cycle. Pools that retain water for longer periods are also important, especially in drought years, when some pools may dry up too soon. Vernal pools vary in the animals that are present, yet most are characterized by the presence of at least one “indicator” species, one that depends on vernal pool habitat for successful reproduction. Vernal pool indicator species include fairy shrimp (small crustaceans), wood frog, spotted salamander, and blue-spotted and Jefferson salamanders.

Moreno (2002) documented 22 well-distributed vernal pools on the Town Forest (Map 7). These pools vary in size and most are isolated pools. Vegetation in around the vernal pools varies and includes moss, sedges, ferns, highbush blueberry, winterberry, red maple, and eastern hemlock. All are characterized by complete or partial canopy closure, which provides shade and maintains cooler water temperatures. Leaves and branches that fall from overstory or nearby vegetation form the basis of the food chain within these pools. A detailed animal survey of each of these vernal pools has not been completed; however several have been documented with one or more indicator species. Vernal pools are described in more detail below.

## Headwater Streams

The health of larger rivers and streams is dependent on the health of smaller streams and wetlands farther up in the headwaters of a watershed. These small headwater streams may make up 80 percent of the stream network in a region and include both seasonal and year-round streams. Headwater streams may begin as trickles, seeps, or depressions that overflow and are often not named or mapped. Yet, the quality and integrity of these headwater streams is critical to downstream habitats.

The upper reaches of a watershed store water, recharge groundwater, and reduce the intensity and frequency of floods. Small streams are a critical link between land and water. Not only are they linked to upstream and downstream portions of the watershed, but water flowing from the land into the stream carries insects, leaves, soil, branches, and other material that are the start of a food chain. This exchange between land and water occurs in a transition zone along the edges of stream channels, called a riparian area. Maintaining connectivity between stream channels, stream bottoms and banks, and the riparian area is important to protect water quality and aquatic habitats. Much of the cleansing action and nutrient cycling in a stream occurs in saturated sediments, at the interface between stream water and the channel bottom and stream bank.<sup>6</sup>

The Town Forest supports several headwater streams and drainages that flow into Great Meadow forming a portion of the PowWow River headwaters. Likewise a few headwater streams flow into the Exeter River tributaries (Map 6).

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<sup>4</sup> Kenney, L.P. and M.R. Burne. 2001. A field guide to the animals of vernal pools. Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts.

<sup>5</sup> Tappan, A. 1997. Identification and documentation of vernal pools in New Hampshire. New Hampshire Fish and Game Department, Concord, New Hampshire.

<sup>6</sup> American Rivers and the Sierra Club. 2007. Where Rivers are Born: The Scientific Imperative for Defending Small Streams and Watersheds.

## Aquifers and Groundwater

Aquifers are concentrations of groundwater and those having medium to high potential to yield groundwater occur in the seacoast areas as alluvial deposits of sand and gravel (“unconsolidated”) or in bedrock fractures (“consolidated”). The major source of recharge to these aquifers is through precipitation filtering directly down into the aquifer. The unconsolidated sand and gravel deposits are called “stratified drift aquifers” and typically yield more groundwater than bedrock fractures.

Danville relies primarily on groundwater as the primary source of its water supply. Danville has one medium potential aquifer (less than 1,000 gallons per day potential) located in the center of town, between the Kingston the Sandown Roads. The northwest corner of the Town Forest overlays this stratified drift aquifer (Danville Natural Resource Inventory) (Map 6).

Several wellhead protection areas, as delineated by NH Department of Environmental Sciences (DES), encompass a portion of the Town Forest (Map 6). These areas identify an area around groundwater wells that supply residential developments.

## Upland Habitats

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Upland forest and early successional habitat comprise approximately 289 acres or 68% of the Town Forest. The Danville Town Forest is considered a Hemlock-Hardwood-Pine “matrix” forest with some features characteristic of Appalachian-Oak Pine matrix forest (as defined in the NH Wildlife Action Plan). Within these broad matrix forest types are different patches or stands of trees. Moreno (2002) mapped thirteen different forest types (stands) based on the dominant tree species and age class.

The dominant tree species on the Town Forest are white pine, red oak, and hemlock. White oak, black oak, red pine, white birch, and black birch each comprise about one percent by volume of the tree species (Moreno 2002). Other tree species scattered throughout the Town Forest include shagbark hickory, sugar maple, white ash, yellow birch, bigtooth aspen, basswood, and American beech. The presence of black and white oak and shagbark hickory, which occur on the drier soils of slopes, ridges, or terraces on the Town Forest, reflect some of the aspects of Appalachian oak-pine forests.

Understory woody and herbaceous plants in these upland forests include witch hazel, maple-leaved viburnum, wintergreen, partridgeberry, sessile-leaved bellwort, Canada mayflower, wild sarsaparilla, starflower, goldthread, dwarf ginseng, ground pine, ground cedar, New York fern, spinulose wood fern, lady fern, among other plants. The amount of herbaceous ground cover and woody debris and shrub and understory diversity varies across the forest.

The powerline corridor offers early successional habitat and comprises 18 acres or 4% of the Town Forest. Young hardwood forest, about 30 years old, occurs on about 14 acres. The remaining upland forest is 50-100+ years old, with a few older trees. The forest will continue to mature naturally, except where disturbance sets back succession.

### *Early Successional/Young Forest*

The powerline corridor in the western section of the Forest supports “permanent” early successional upland (and some wetland) habitat, maintained through periodic mowing by PSNH (Map 7). Although a highly disturbed habitat, the shrub and young tree community supports a unique set of wildlife species (e.g., prairie warbler), not found on the rest of the Town Forest. The diversity of plant species includes raspberry, blackberry, silky dogwood, highbush blueberry, speckled alder, quaking and bigtooth aspen, willow sp, staghorn sumac, pin cherry, gray birch, and red oak, among other species This diversity

provides food sources, cover, nest sites, and escape areas for many wildlife as discussed below. This area is also used by motorized recreational vehicles, and it is not clear what impact these are having on the productivity of wildlife in this corridor.

Moreno (2002) mapped and described approximately 14.5-acres of early successional habitat or young forest in several small patches in the Town Forest (Map 7). Without further disturbance these patches are naturally succeeding beyond the early successional stage and into a young sapling/pole forest. Tree species include gray birch, paper birch, red maple, witchhazel, white pine, white oak, and red oak. Returning these area to an earlier successional stage would require active management, as recommended by Moreno (2002).

#### *Mature Hardwood Forest*

The Town Forest has extensive hardwood and mixed hardwood stands that are dominated with red oak, with a mix of black oak, white oak, American beech, black birch, white birch, and white pine. These forests produce abundant acorn crops for wildlife as well as capacity for producing high quality wood products. The diversity of herbaceous plants, shrub and sapling composition and diversity and woody debris is relatively low in most of these forests.

#### *Mature Mixed Hardwood/Softwood Forest*

These mixed forests are found throughout the Town Forest, but are most evident in the western portion (Moreno 2002). The tree species diversity is greater in these forests, including a mix of hardwoods (e.g., red oak, red maple, black and white birches, American beech) and softwoods (e.g., white pine, hemlock). The vertical layering with the forest understory is more diverse, perhaps a result of varying land use histories and disturbances.

#### *Softwood Forest*

Softwood forests on the Town Forest include small pockets of 75+ year old white pine stands scattered throughout the forest (Moreno 2002). Typically these are stands that have grown in after a field or pasture was abandoned. These stands offer some habitat for roosting owls or hawks, or other birds during winter, but lack tree species diversity and vertical structure that would attract greater wildlife diversity. The same is true for the one-acre red pine plantation near the old gravel pit. Scattered oaks and other mast trees in the midst of the pines, provides opportunities for future habitat management.

Forested wetlands dominated by hemlock and the upland hemlock-hardwood stands offer more vegetation diversity and structure and in turn support more wildlife diversity. Closed-canopy hemlock forests provide high quality winter shelter for white-tailed deer and wintering birds. Snow depths and wind chills are significantly lower in these forests, which is particularly important during harsh winters.

## **Wildlife and Their Habitats**

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Wildlife need food, water, cover, and space to live and reproduce--collectively known as their *habitat*. Each species has unique habitat requirements, and the presence of a given species in an area varies depending on the availability of the habitat features that they depend on. Wildlife food resources include aquatic and upland plants, fruits, seeds and nuts, insects and other animals, and nectar. All wildlife require water, almost daily, yet aquatic organisms clearly depend on it more than upland species. Cover provides protection from weather and predators and sites for nesting, resting, travel, and other activities. The juxtaposition of food, water, and cover determines the wildlife community that occurs in a given area.

An area with many different kinds of food, water, and cover typically supports a greater diversity of wildlife. This reflects *habitat structure*, an important concept in understanding the distribution and abundance of wildlife. The components of habitat structure and their presence or lack therefore on the Danville Town Forest are discussed below.

- **Horizontal vegetation diversity**

This refers to the horizontal arrangement of different plant communities (including type and age) in a given area. Areas with aquatic habitats and non-forest habitats such as fields as well as forest are more horizontally diverse than an area that is just forested. For instance, a 100-acre mature hardwood forest has less horizontal vegetation diversity than another 100-acre habitat that supports a mix of emergent wetland, shrubs, and upland mixed forest. Likewise, a 100-acre forest that has a mix of tree ages that includes a grassy opening, young forest, saplings, and mature, old trees is more diverse than a 100-acre forest with just sapling/pole-sized trees. A wetland that has concentric rings of open water, emergent marsh, shrub thicket, and tall trees is more horizontally diverse than an open water pond with a sandy shore that extends to lawn.

Looking at the Danville Town Forest in its entirety, the horizontal vegetation diversity offers a variety of different habitat conditions that include:

- Mature hardwood forest
- Mature mixed hardwood/softwood forest
- Early successional habitat/powerline corridor
- Wetland complexes that include open water-emergent marsh-scrub shrub-forested wetland

Habitat management can change and enhance horizontal diversity through diversifying the age, size, and structure of the forest habitats. Natural disturbances, including beaver, are important drivers of horizontal diversity.

- **Vertical vegetation diversity**

Vertical diversity refers to the extent of layering within a forest or other habitat. Layering within a forest includes the arrangement of ground cover (lichens, moss, ferns, herbaceous plants), vines and shrubs, and trees (including sizes and ages). The greater the variety of vertical layers, the greater the diversity of habitat, the greater the diversity of wildlife. These layers provide cover from predators, nest and den sites, foraging surfaces, food sources, shade, and more. Vertebrate wildlife typically respond more to vegetation structure than to the presence of specific plant species. Vertical and horizontal structure that is varied, lush, and “messy” is a boon to wildlife. Forests with little ground cover, dead wood, shrubs, and understory have fewer wildlife species.

The Danville Town Forest, like most forests in New England, is still recovering from the period of intense agriculture and natural reforestation. Some of the Town Forest is even-aged or two-aged, having grown back at the time a field or pasture was abandoned or the forest heavily logged. In time, perhaps hundreds of years, a natural disturbance pattern will create a richer vertical diversity that was thought to have been present in pre-settlement forests. Natural disturbances will continue yet not as extensively as in historic times, since humans have eliminated (fire), restricted (beaver), or otherwise altered natural disturbance patterns; hence a role for humans in replicating some natural disturbances. Active management, through selective habitat management or forestry, can serve to emulate disturbance, creating more diversity for wildlife.

- **Food Resources**

The availability of food resources for wildlife is a key component of their habitat needs, and often varies seasonally. Breeding birds depend on a flush of insects to feed their young nestlings, while later in

summer and into fall and winter they switch to berries, nuts, and seeds. Deer, moose, and other browsers rely on herbaceous vegetation during the growing season and woody growth in winter. Larger mammals such as coyote, fox, and fisher prey on other animals as well as eating fruits when available. Seeds are favorites of squirrels, nuthatches, siskins, mice, and voles.

Fruits, nuts, and seeds from woody plants that are food for wildlife are collectively known as “mast.” Hard mast includes the array of nuts and seeds, which are typically high in fat, carbohydrates, and protein, a food source that is both high in energy content and available into the winter. Soft mast includes fruits and berries such as cherries, dogwoods, blueberries, winterberry, grapes, and the fleshy fruits of other trees, shrubs, and vines. Soft mast is more perishable and is often high in sugar, vitamins, and carbohydrates. These fruits are a source of moisture for wildlife during drought years, and are a crucial energy source for some migrating songbirds.

A diversity of hard and soft mast producing trees, shrubs, and vines is important. Different mast species are available at different times of year, which is critical to wildlife. Also, some species, such as oak only produce heavy acorn crops every 2 to 10 years, and this varies among oak species. Peak acorn production occurs when red oak are 19-22 inches in diameter at breast height (dbh); white oak at 24-30 inches dbh. White oak acorns have less tannin and hence are more palatable to wildlife than red or black oak acorns. Birches, maples, ashes, and basswood are also used by seed-eating wildlife.<sup>7</sup>

The Danville Town Forest has abundant oaks, including red, white, and black, but few other hard mast species in great abundance. Soft mast species on the Town Forest include highbush blueberry, winterberry and dogwoods in and around wetlands, and cherries, raspberries, dogwoods, viburnums and sumac in the powerline corridor. The Town Forest has a healthy supply of white pine and hemlock, a source of seeds for birds and mammals. The upland forest currently produces little soft mast (fleshy fruits) for wildlife.

- **Cavity trees, live and dead and dying**

Nearly two-dozen birds and mammals depend on tree cavities for nesting, roosting, or denning. At one species, the brown creeper nests under the loose bark on standing trees. These species require a range of cavity tree size classes and rely on a mix of dead or partially dead standing trees (called “snags”) as well as live trees with cavities. Woodpeckers, chickadees, and red-breasted nuthatch are primary excavators (i.e., they make the holes), while others use existing holes.

The Danville Town Forest has cavity trees scattered throughout, although the number of such trees is limited, particularly the large sizes. Some of the wildlife species found on the Forest and their required tree cavity sizes (diameter at breast height) include:

<u>&lt;8”</u>	<u>6-12”</u>	<u>12-18”</u>
black-capped chickadee	hairy woodpecker	great-crested flycatcher
downy woodpecker	red-breasted nuthatch	
tufted titmouse	white-breasted nuthatch	
winter wren	brown creeper	
<u>&gt;18”</u>	<u>&gt;24”</u>	
wood duck	raccoon	
hooded merganser		
pileated woodpecker		
gray squirrel		

<sup>7</sup> New Hampshire Forest Sustainability Standards Work Team. 1997. Good forestry in the Granite State: recommended voluntary forest management practices for New Hampshire. Concord, New Hampshire.

red squirrel  
porcupine

- **Dead and down woody debris**

Dead and down woody debris (often called “coarse woody debris”) on the forest floor is important for many reasons. Woody debris in various stages of decay includes logs, stumps, branches, upturned roots, and tree falls. These features provide wildlife habitat, serve as nurse logs for regeneration plants, and contribute to nutrient cycling. As with cavity trees, the larger the fallen log or stump the greater the biodiversity value. Decaying wood supports many insects and other invertebrates, which are food sources for shrews, woodpeckers, and black bears. Snakes, fisher, and weasels hunt among the woody debris. Many species including mice, voles, salamanders, snakes, chipmunks, red squirrels, weasels, black bear use coarse woody debris for cover, den sites, and escape areas. The winter wren nests in upturned tree roots. Mosses, fungi, and lichen are often associated with decaying wood. Fallen logs and other woody debris are also important in aquatic environments. Turtles, mink, otter, and waterfowl bask on this wood and fish find cover in woody debris.<sup>8</sup>

As with cavity trees, the Danville Town Forest is low in coarse woody debris. This is not atypical in New England forests that are recovering from past agriculture and intensive logging. The size of coarse woody debris is related to past land use since large trees and dying trees are often removed before they reach the stage of decaying on the ground. The amount and size of woody debris is naturally increasing as New Hampshire forests are maturing, assuming not all is removed.

- **Inclusions**

Inclusions are small patches of trees that are different from the majority of the surrounding forest. For example, a patch of hemlock in a primarily hardwood stand, or a few oaks in a primarily softwood stand are inclusions. These inclusions increase the habitat diversity in what could be an otherwise homogenous habitat type, and therefore often support more wildlife. A black-capped chickadee finds cover on a cold winter day in a hemlock nestled among a stand of hardwoods. A few hemlock in a hardwood stand may be enough to support a blue-headed vireo, which typically occurs in a more conifer-dominated stand. Inclusions are by nature small in scale, and should be considered during forest management planning and implementation.

### **Wildlife-Habitat Associations**

The types and sizes of vegetation and other structural features determine the wildlife that occurs in a given habitat. The Danville Town Forest supports several different habitat types that support a unique set of wildlife species (Map 7). The presence or abundance of a given wildlife species often depends on the availability of the structural features described above. A spreadsheet of plant and animal species documented on the Town Forest is in Appendix D. Many other wildlife species are likely present, but are either difficult to detect or are active at other times of year than when these data were gathered. Also, no systematic survey of invertebrates or plants has been conducted. This species list can be augmented over time by observations of others.

The following habitats and associated wildlife are documented for the Town Forest and provide a good example of how some species are associated with certain habitat types. Some species are generalists, such as white-tailed deer, and occur in most if not all the habitats.

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<sup>8</sup> New Hampshire Forest Sustainability Standards Work Team. 1997. Good forestry in the Granite State: recommended voluntary forest management practices for New Hampshire. Concord, New Hampshire.

***Oak and Oak-Pine Forest***

Blue jay, white-breasted nuthatch, red-eyed vireo, wild turkey, pileated woodpecker, tufted titmouse, wood thrush, black-and-white warbler, ovenbird, scarlet tanager, American crow, gray squirrel, eastern chipmunk

***Pine-Hemlock-Mixed Hardwoods***

Blue-headed vireo, black-throated-green warbler, hermit thrush, pine warbler, winter wren, red squirrel, porcupine, fisher

***Early Successional (Powerline)***

Prairie warbler, chestnut-sided warbler, indigo bunting, eastern towhee, field sparrow, coyote

***Wetlands: Open Water/Emergent Marsh***

Beaver, otter, muskrat, bullfrog, hooded merganser, mallard, Canada goose, painted turtle, great blue heron

***Wetlands: Scrub-Shrub and Forested***

Beaver, mink, swamp sparrow, red-winged blackbird, common grackle, common yellowthroat, yellow warbler, tree swallow, eastern phoebe, great-blue heron, wood duck, red-shouldered hawk, veery, gray catbird, snowshoe hare

***Wetlands: Vernal Pools***

Wood frog, spotted salamander, blue-spotted salamander, spring peeper, gray treefrog

***Vernal Pools***

As noted, the Danville Town Forest harbors nearly two-dozen vernal pools. These pools are home to breeding amphibians including wood frog, spotted and blue-spotted salamander, as well as fairy shrimp. Spring peeper, gray treefrog, and American toad also breed in some of these vernal pools, although they also breed in other types of wetlands. Smaller organisms such as bacteria, fungi, zooplankton (e.g., daphnia), caddisfly and other insect larvae, crustaceans and insects are all food for the larger vertebrates within these vernal pools. Salamander larvae also eat other salamander larvae.

Adult amphibians travel to vernal pools in early spring (late March-May) to mate and lay eggs. For the other 11 months of the year, these salamanders and frogs live in the upland within a few hundred feet of the pool, and sometimes up to a ¼ mile away. Adult wood frogs are commonly seen hopping around on the forest floor; in winter they hibernate under logs, stumps, rocks, or leaf litter. The “mole” salamanders, including spotted and blue-spotted, spend most of the year under logs, in animal burrows, or other places below ground.

Vernal pools also serve as “stepping stones” for turtles, providing food and cover as they travel overland between larger wetlands. Snakes, raccoon, mink, and great-blue herons, among other wildlife species, occasional forage in vernal pools. A researcher in Massachusetts found the biomass of vernal pool amphibians to be greater than the biomass of all the birds and mammals combined in the upland forest surrounding his study pool.<sup>9</sup> Clearly, these habitats and associated wildlife are key biological elements of the forested landscape. Maintaining suitable upland habitat conditions around vernal pools is as important as protecting the pools from disturbance. Canopy shade, deep leaf litter, and fallen trees and stumps are all important.

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<sup>9</sup> Calhoun, A.J.K. and P. deMaynadier. 2004. Forestry habitat management guidelines for vernal pool wildlife. MCA Technical Paper No. 6, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

In the dry seasons vernal pools are often only noticeable in the forest as small depressions with compacted leaves or dark waterstains. Sometimes harvesting and recreational activities create depressions such as ruts, ditches, or borrow pits that fill with water. Amphibians may breed and lay eggs here, but usually these artificial pools dry up much sooner and are not comparable to natural vernal pools. The State of Maine developed a set of management guidelines for vernal pools that address the vernal pool depression, vernal pool protection zone (within 100 feet), and amphibian life zone (100-400 ft). These recommendations are addressed in Chapter 4.

### ***Beaver Influenced Wetlands***

Beaver are a key species in wetland systems as their activity creates habitat for many other plants and animals. This industrious rodent builds dams on perennial streams, flooding one or more acres upstream. This provides access to food, protection from terrestrial predators and shelter in winter, including underwater access to their lodge. Beaver feed on aquatic plants (e.g., water lily, duck potato, waterweed, pondweed, and duckweed) and shoots, twigs, leaves, roots, and bark of woody plants (e.g., aspen, willow, birches, witch hazel). They fell trees to get access to the tender leaves, twigs, and bark.

Eventually beavers abandon their pond, either when preferred food plants become scarce or when silt accumulation makes them too shallow. With beaver gone, the dam begins to break and the pond drains. In the nutrient rich silt, herbaceous plants flourish, forming “beaver meadows.” Over time, shrubs and trees begin to dominate the area, creating ideal habitat again for beaver to return.<sup>10</sup> Beaver-influenced wetlands are dynamic, cycling through successional stages from flooded stream (pond) to marsh, shrubland, young forest, then back to pond when the beaver return. Other wildlife that benefit from beaver-created habitats, also cycle through these changing habitat conditions.

The great-blue heron, a prominent and popular species on the Town Forest, is an associate of these beaver flowages. An historic heron rookery, once the second largest in the State, is still active (although much smaller now) on Rookery Pond, a portion of which is on the Town Forest. In recent years herons began nesting on Great Meadow. In 2008, each rookery supported about 13 active nests. As rising waters behind new beaver dams flood trees, they provide ideal nesting habitat for great blue heron colonies. Flooded areas provide protection from raccoons and other predators of heron nestlings. As flooded trees die, cavities form in them, providing nesting habitat for tree swallows, wood ducks, and hooded mergansers. Over time, the trees fall over, leaving herons, swallows and wood ducks to disperse elsewhere, perhaps to new beaver ponds. Eventually the Danville Town Forest herons will shift to a new site.

Beaver activity sometimes creates conflicts with humans through flooding of roads, trails, and woodlands. Flooding caused by beavers can kill trees that are considered ideal as future logs or other wood products. Tuckerman Road is currently flooded around the mid-section from beavers active in Great Meadow, preventing access by hikers and other recreational uses to the western section of the Town Forest. Hikers, but not all-terrain vehicles, can take a longer trail around the wetland to reach the powerline and western portion of the Town Forest.

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<sup>10</sup> Jackson, S. and T. Decker, *Beavers in Massachusetts*. 2004. University of Massachusetts Cooperative Extension System, Massachusetts Division of Fisheries and Wildlife.

## Rare Plants, Exemplary Plant Communities, and Threatened and Endangered Wildlife

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The New Hampshire Natural Heritage Bureau (NHNHB) finds, tracks, and facilitates the protection of rare plants and exemplary natural communities. They also maintain information on rare wildlife in cooperation with the NH Fish and Game Department. Natural Heritage defines a natural community as “recurring assemblages of plants and animals found in particular physical environments.” Each type of natural community has a unique set of environmental conditions that support certain species adapted to those conditions. Exemplary natural communities include nearly all examples of rare types and high-quality examples of common types (Sperduto and Nichols 2004). There are currently no known rare plant species or exemplary plant communities on the Danville Town Forest, although no formal inventory has been conducted here by the NHNHB. A more thorough plant inventory of the Great Meadow and other wetland drainages would be useful given the high plant diversity in these communities.

However several wildlife species documented on the Town Forest are considered “species of greatest conservation concern” by NHFG as described in the NH Wildlife Action Plan. These include blue-spotted salamander, Blanding’s turtle, eastern towhee, great blue heron, palm warbler (migration), red-shouldered hawk, and veery. These species are associated with vernal pools (blue-spotted salamander), large wetlands (great blue heron, red-shouldered hawk, palm warbler, Blanding’s turtle), early successional habitat (eastern towhee) and large unfragmented habitats (veery). The New Hampshire Fish and Game Department has proposed changes to the list of threatened and endangered species in New Hampshire; the Blanding’s turtle is proposed to be added as an endangered species. There are no other known threatened or endangered wildlife species on the Town Forest.

## Invasive Species

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Many factors affect forest health including air pollution, water pollution, introduced insects and diseases, invasive plants, and climate change. The global economy, with world-wide trade and transport, has brought greater numbers of introduced insects, diseases, and plants to the U.S. Non-native invasive plants have generated great concern, such that the NH Legislative passed an Invasive Species Act (RSA 430: 51-57) that says “No person shall knowingly collect, transport, sell, distribute, propagate, or transplant any living or any viable portion of a listed prohibited species including all the cultivars, varieties, and specified hybrids.”

The concern about non-native invasive plants are the traits that allow them to out-compete native species. In places, this has led to decreased biological diversity, impacts to natural communities, loss of wildlife habitat, cropland and pasture, The traits of non-native invasive plants include high productivity, aggressive root systems, thrive on disturbance, habitat generalists, and a lack of predators.

The list of prohibited plants for New Hampshire include the following:

<i>Acer platanoides</i>	Norway Maple
<i>Ailanthus altissima</i>	Tree of Heaven
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Berberis thunbergii</i>	Japanese Barberry
<i>Berberis vulgaris</i>	European Barberry
<i>Butomous umbellate</i>	Flowering Rush
<i>Cabomba caroliniana</i>	Fanwort
<i>Celastrus orbiculatus</i>	Oriental Bittersweet

<i>Cynanchum nigrum</i>	Black Swallow-wort
<i>Cynanchum rossicum</i>	Pale Swallow-wort
<i>Egeria densa</i>	Brazilian elodea
<i>Elaeagnus umbellata</i>	Autumn Olive
<i>Euonymus alatus</i>	Burning Bush
<i>Heracleum mantegazzianum</i>	Giant Hogweed
<i>Hydrilla verticillata</i>	Hydrilla
<i>Hydrocharis morsus-ranae</i>	European Frogbit
<i>Iris pseudacorus</i>	Water-flag
<i>Ligustrum obtusifolium</i>	Blunt-leaved Privet
<i>Lonicera x bella</i>	Showy Bush Honeysuckle
<i>Lonicera japonica</i>	Japanese Honeysuckle
<i>Lonicera morrowii</i>	Morrow's Honeysuckle
<i>Lonicera tatarica</i>	Tartarian Honeysuckle
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Myriophyllum aquaticum</i>	Parrot Feather
<i>Myriophyllum heterophyllum</i>	Variable Milfoil
<i>Myriophyllum spicatum</i>	European Water-Milfoil
<i>Najas minor</i>	European Naiad
<i>Nymphoides peltata</i>	Yellow Floating Heart
<i>Phragmites australis</i>	Common Reed
<i>Polygonum cuspidatum</i>	Japanese Knotweed
<i>Potamogeton crispus</i>	Curly-leaf Pondweed
<i>Rhamnus cathartica</i>	Common Buckthorn
<i>Rhamnus frangula</i>	Glossy Buckthorn
<i>Rosa multiflora</i>	Multiflora Rose
<i>Trapa nutans</i>	Water Chestnut

The Danville Town Forest is relatively free of invasive species, however regular monitoring for these species is recommended.

## Public Uses, Trails, and Cultural and Historical Features

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The Danville Town Forest has a long history of public use. As described earlier, the stonewalls found in parts of the Town Forest tell of a past land use (Map 2). Tuckertown Road and other woods roads tell of some past logging activity along with travel between Danville and Sandown. At this time, no other historic buildings are known to occur on the Town Forest.

The 1+ mile Tuckertown Road, now a Class A trail, is used extensively for a variety of outdoor recreation (including walking, nature observation, jogging, mountain biking, horseback riding, and motorized recreation) and educational walks. Tuckertown Road leads from Rte 111A to the PSNH powerline which is used for similar activities and continues on beyond the Town Forest. A secondary woods road leads from Tuckertown Road west of the Great Meadow drainage north toward Rookery Pond and then turns west to the powerline. Several other older woods roads and trails lead from these main arteries.

Recently the Forestry Committee constructed a small parking lot off Route 111A. This is the main access to the Town Forest. A kiosk provides information about the Town Forest. Trails lead from here to Great Meadow, offering views of the great blue heron rookery, and meander to Tuckertown Road (Map 2).

The Town Forest is open to hunting and fishing. Camping is not allowed, except by special permission. Kayaking is possible in the Great Meadow, although access is difficult.

Tuckertown Road and the PSNH utility corridor are open to motorized recreation, including snowmobiles and all-terrain vehicles (ATVs). However, some ATV users are using the trails north of Tuckertown Road, which is creating rutting and erosion in places where these trails cross wetland drainages or ascend steep slopes. This is particularly evident on the trail north of Tuckertown Road near the Great Meadow drainage.

An old gravel pit off Tuckertown Road is being used for target practice.. In addition, the site is used to dump trash and spent cartridges are left at the site. Access to the site appears to be via the powerline corridor.

The 20-acre parcel off Happy Hollow Road does not have formal trails since access to the site is limited. A wetland located at the northern end of the parcel blocks easy access from the road. Access through abutting properties is not available at this time. However an informal trail is found at the southern end of the property appears to be actively used by motorized and non-motorized users.