CHAPTER 8 NATURAL RESOURCES

Photo: Kamal Nath

8.1. Introduction

Effingham Conservation Commission (ECC) assembled a Natural Resources Inventory in 2007. At its simplest, a Natural Resources Inventory (NRI) is an identification, description and compilation of a given Town's Natural Resources based on maps and scientific data. Chapter 8 of this Master Plan is based on the 2007 NRI. The entire NRI is available in the appendix of this document.

The primary focus of the Natural Resources chapter is to identify the natural resources in the town of Effingham, recognize the role these resources play in giving the Town its character and decide what strategies would best maintain this character (see Section 8.9 titled Natural Resource Goals). All of the community's resources are interconnected and any change to one can have a significant impact on the others. As the population increases, demands on many of these resources will increase, possibly to the point of threatening the quality and quantity of the resource. The goal of this Natural Resources Inventory is to help develop a balance between development and resource protection within Effingham that will guide future sustainable development of the community.

Below is a summary of a few features of the natural resources in Effingham.

Table 1: Effingham Land and Water Distribution

Type	Acres
Total Town Area	25,555.9 (39.9 sq. mi.)
Total Land Area	24,827.0
Total Water Area	728.9
Total Hydric Area	6,461.3
Total NWI Area	4,094.8

Acreages for land area, water, hydric soils and National Wetland Inventory (NWI) wetlands provided by *NH GRANIT* (*http://www.granit.sr.unh.edu/*).

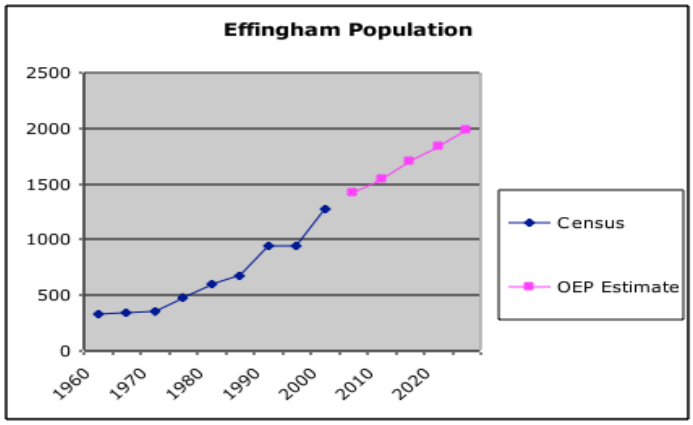
Table 2: Effingham Steep Slopes and Wetlands

Type	Acres
Total Land Area	24,827.0
Area with Slope of 15-25%	3,019.0
Area with Slope of 25%+	2,325.0
Steep Slope as % of Total Land	21.5%
Total Wetlands Area	5,700.0
Wetlands as % of Total Land	22.3%

(Sources: Ossipee Watershed Coalition – *Natural Resources Planning Guidebook 2007, Effingham Wetlands Inventory Project – 2005-07*)

Table 3: Population

2010 Census	1,465
Population Growth (1995-2010)	51.4%
Density (persons/square mile)	36.7
OEP Estimated Population	1,980
Estimated Growth (2005-2025)	38.9%



Source: *Population Estimates*, State Data Center Library, NH Office of Energy and Planning, September 2006; *2005 Household Estimates for NH Cities and Towns*, NH Office of Energy & Planning, September 2006; *Historical OEP Estimate Data*, State Data Center Library, NH Office of Energy & Planning

Table 4: Effingham Geography

Total Size	39.93 square miles
Land Area	24,878.0 acres
Surface Waters	724.0 acres
Shoreline of Great Ponds	3.16 miles
Protected Land	6,619.0 acres (26%)
Current Use	11,028.0 acres (41%)
Forested Land	20,868.0 acres (84%)
Tree Farms (10)	1,863.0 acres
Water Supply Land	5,488.0 acres
Area of EPA High Value Wetlands	1,044.0 acres
Number of Rare Species & Natural Communities	5.0

Source: *New Hampshire's Changing Landscape 2005 Update,* Society for the Protection of New Hampshire's Forests; *2006 Report of Land in Current Use*, NH Department of Revenue Administration; *Tree Farms in New Hampshire*, NH Tree Farm Program, August 2000; Shoreland Waterbody Results, OneStop Data Retrieval, NH

Table 5: Effingham's Changing Landscape

	Acres	% of Town
Land Value per Acre (2003) $1,424.00		
Important Forest Soils	16,424.0	66.2%
Protected Important Forest Soils	2,462.0	
Prime Agricultural Soil	195.0	0.8%
Protected Prime Agricultural Soils	67.8	
Prime White Pine Soil	4,437.0	17.9%

Protected White Pine Soils	1,245.0	
NWI Acres	4,095.0	16.5%
Protected NWI Acres (2004)	1,151.0	
High Yield Aquifer	3,756.0	
Wellhead Protection Area	4,503.0	
% Protected Total Water Supply		23.5%
Population Served by Community Water Supplies		520 people

Source: *New Hampshire's Changing Landscape 2005 Update*, Society for the Protection of New Hampshire's Forests

8.2 WATER RESOURCES

8.2. 1 Watersheds

Effingham is one of the six-focus towns in the Ossipee Watershed drainage area. The Saco River Basin covers a 1,700 square mile area that includes 63 municipalities in New Hampshire and Maine. The Saco River starts in the White Mountains of New Hampshire, is joined in Cornish, Maine by the Ossipee River and ends at Saco Bay on the Maine coast.

The Ossipee Watershed (Figure 1) is included within the Saco River Basin and comprises about 379 square miles in area, located in Carroll and Grafton Counties in New Hampshire and York County in Maine. It contains 82 lakes and ponds and, at its widest point, the watershed extends approximately 29 miles east and west and 23 miles north and south. Waters from the Ossipee Watershed flow into the Saco River via the Ossipee River. The watershed's drainage area encompasses portions of 14 towns in New Hampshire (and is especially focused on six of them) and one town in Maine. The mountains of the Sandwich Range to the northwest, the Ossipee Mountains to the south and the sandy pine barren lands of the Ossipee-Freedom-Effingham plains to the east bound it. Elevations range from 375 feet at the Maine-New Hampshire border in Effingham to 4,060 feet on Mount Passaconway in Waterville.

Figure 1 Ossipee Whatershed

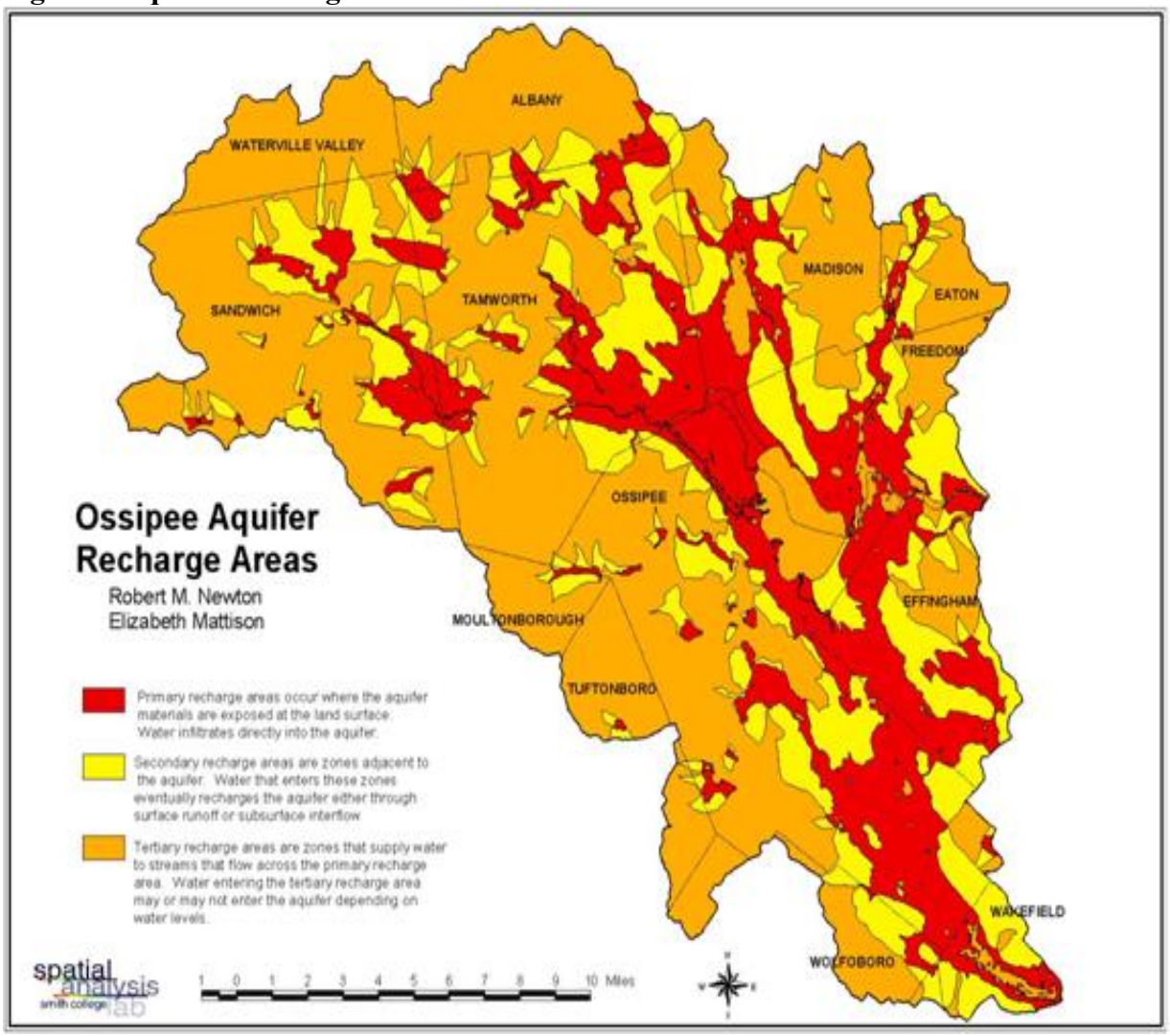
The Ossipee Watershed is comprised of 13 distinct drainage subsystems or sub-watersheds. Table 3 below indicates six of these 13 sub-watersheds located in the town of Effingham. About 14.7 % of Effingham overlays a high yield aquifer consisting of water supply land.

Table 6: Effingham Sub-watersheds

Sub-watershed	Town(s)
Broad/Leavitt Bay Watershed	Effingham, Freedom, Ossipee
Dan Hole Pond Watershed	Effingham, Ossipee
Lovell River Watershed	Effingham, Freedom, Ossipee
Maine State Line Watershed	Effingham, Freedom
Pine River Watershed	Effingham, Ossipee
South River Watershed	Effingham

A stratified drift aquifer consists of highly porous subsurface sand and gravel soil deposited by melting glaciers that covers 15% of the state. Aquifers of this type are referred to as high yield aquifers because they recharge rapidly. They are connected to water supply lands with highly permeable soils that readily absorb precipitation and allow it to percolate rapidly (at more than 2,000 feet per day) down to the subsurface water table and on to fill the aquifer. Water Supply Lands or aquifer recharge areas, shown in Figure 2 with red and yellow, are surface land areas connected with the groundwater by highly porous soil or rock layers.

Figure 2 Aquifer Recharge Areas



Aquifers formed from melt-water stream deposits are sensitive to developmental land use changes. Paving and building construction create impermeable surfaces that reduce groundwater recharge. Septic tanks, leaky petroleum tanks, chemical spills, and applications of fertilizer, road salt, pesticides and herbicides can all severely affect groundwater quality. The geomorphic processes that created the aquifer also created a landscape that has physical characteristics conducive to development. The flat slopes and very well drained soils of melt-water stream deposits are much sought after attributes for land developers.

Approximately 47 percent of the watershed is level to nearly level land (< 3 percent slope) and of that, almost half is occupied by the aquifer. If you add in secondary recharge areas, this increases to almost 70 percent. This creates a conflict between the need to protect the aquifer and the desire to increase economic development.

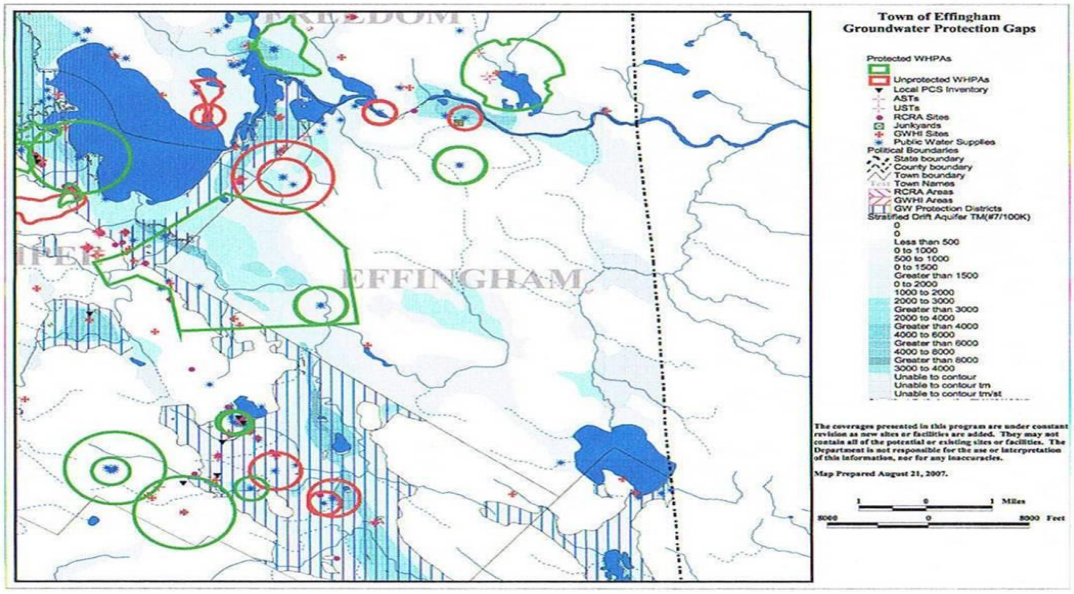
8.2.2 Drinking Water Resources

The majority of residents and businesses in the town of Effingham, in line with the Ossipee Watershed in general, use wells to get their drinking water from groundwater resources. Of the approximately 27,000 acres of high yield aquifer (i.e., best suited for well placement) that exist within the Ossipee Watershed, roughly 5,557 acres, or about 20%, is currently protected (lying beneath conservation lands).

Table 7: Wellhead Protection Areas

Wellhead Protection Area	4,503.3
Protected WHPA	1,091.2
% Protected WHPA	24.2
Coincident High Yield Aquifer & WHPA	2,609.0
Protected Coincident Aquifer & WHPA	893.2
% Protected Aquifer & WHPA	34.2

Figure 3 Groundwater Protection Gaps



(Source: Paul Susca, Supervisor, Drinking Water and Groundwater Bureau; *NHDES – 2007*)

A wellhead protection area (WHPA**)** refers to a circular area of land centered over a well and drawn at a radius related to the well's capacity. The assumption that the WHPA is circular has to be made if resources are not available to do a rigorous aquifer analysis via pumping tests. In reality, unless the aquifer is homogeneous and isotropic (which seldom if ever occurs in nature), the WHPA will not be perfectly circular.

There are five WHPAs in the town of Effingham for a groundwater source. For community and non-transient systems, the WHPA is the area from which water is expected to flow to the

well under extreme dry conditions. For transient systems, the WHPA is the area within 500 ft of the well. As seen in the map (Figure 3), there are two medium size protected WHPAs in Effingham. However, two small and the largest WHPA, consisting of two wellheads in Effingham, remain unprotected. This largest wellhead covers the groundwater in the adjacent town of Ossipee.

The watershed in Effingham has exemplary woodlands. The dry pine woodlands of the watershed include an unusual mixed pine - red oak woodland natural community that has three of the four native pines found in the state (red, white, and pitch) growing together. Pine River State Forest in Effingham and Ossipee is home to a large occurrence of the mixed pine - red oak woodland community.

The dry pine woodlands of the Ossipee Watershed are tightly aligned with the highest value recharge areas of the Ossipee aquifer. In many places, these woodlands overlay primary recharge areas with transmissivity values ranging from 6,000 – 8,000 square feet per day. The occurrences of dry pine woodlands in the watershed have also been identified in the Wildlife Action Plan as areas of "highest quality habitat in New Hampshire" and therefore sites of statewide conservation importance.

8.2.3 Wetlands

Wetlands Definition: Wetlands include those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.

In 2005-2007, the Effingham Conservation Commission was granted a NH Mooseplate grant to inventory the wetlands of Effingham and create a baseline study of the Town's wetlands.

Effingham's water bodies and wetlands are some of the town's highest valued resources. Surface waters, including adjacent riparian areas (i.e. bank region surrounding or lining a water body) and associated wetlands, are some of the region's most productive and diverse ecological systems, serving as critical feeding, spawning and brood rearing habitat for many wildlife species. The following is a summary of the riparian areas of the Town.

Table 8: Standing Water Sources (Surface Waters, Wetlands, etc) within Watershed

Type	Acres
Surface Waters	678.0
Shoreline – Great Ponds (>10 acres)	3.16
EPA High Value Wetlands	1044.0

Named lakes and ponds within the Ossipee Watershed include Berry Bay (partial), Chalk Pond, Hutchins Pond, Leavitt Bay (partial), and Province Lake (partial). Named moving water systems (rivers and streams) within the Ossipee Watershed include Flanders Brook, Hodgdon Brook, Leavitt Brook, Marstin Brook, Phillips Brook, Pine River, Red Brook (#2), Wilkinson Brook, Peavy (aka Hayes Daniel) Brook, South River, Stevens Brook, Taylor Brook, and Ossipee River.

All wetlands have functions that serve the surrounding ecosystem. All of these functions also contribute to the well-being of humans; therefore, they are highly valued by the society. The following list of functions and values represents the most commonly recognized benefits associated with wetlands.

Wildlife Habitat – Wetlands and their adjacent upland habitat offer more food, shelter, and reproduction options for wildlife than any other land-based ecosystem.

Groundwater Recharge/Discharge – Wetlands serve as places where water recharges to underlying aquifers as well as places where water discharges onto surrounding landscape.

Sediment and Toxicant Removal and Attenuation – Wetlands act as sediment traps, and the high amount of biological activity serves to break down nutrients and pollutants into harmless forms.

Floodwater Storage and Dissipation of Erosive Forces – The rapid uptake and gradual release of floodwaters saves society billions of dollars over time. Bordering vegetated wetlands along streams, rivers, pond shores and lake shores play an important role in protecting the integrity of shorelines.

Production Export – Hydric soils, if carefully managed, yield more food and fiber than any other agricultural soil. Forested swamps have been shown to sequester high amounts of carbon.

Education / Scientific Research – The high concentration of microhabitats and the ecosystem processes that regulate them make wetlands prime subjects of biological study.

Visual & Aesthetic Resources – Often under-rated, the visual qualities of wetlands offer a welcome break amidst a landscape that is fragmented by development.

8.3 SOILS

Soil is the portion of the surface of the earth that supports plants, animals and humans. There are more than 1,000 different soils in the Northeast, with 21 of them represented in Effingham. Soils information is an intricate part of a natural resource analysis because it provides a wealth of data concerning the capability of land uses. Soils differ from one another in their physical, chemical and biological properties. Soil properties, which affect the capacity to support development, include depth permeability, wetness, slope, susceptibility to erosion, flood hazard, stoniness, among others.

Based on the General Soil Map of the Soil Survey of Carroll County, New Hampshire, published in 1977, the predominant soil associations in Effingham are as follows:

Colton-Adams association: Nearly level to very steep, excessively drained gravelly and sandy soils; on terraces, kames and eskers.

- Colton soils are excessively drained. They formed in gravel and sand deposits. Adams soils are excessively drained. They formed in thick sand deposits. Among the minor soils are scattered spots of moderately well drained Croghan and Duane soils. Both of these soils are in shallow depressions and have a seasonal high water table.
- The main limitation of soils of this association for community development is the potential pollution hazard to ground water from subsurface sewage disposal systems. Doughtiness and low natural fertility are the main limitations for farming. The soils in about one-third of the area are steep enough to have an additional moderate to severe hazard of erosion. Colton soils contain gravel and, in some places, cobbles that interfere with cultivation or landscaping operations.
- Most of this association is wooded, but some is in idle fields or pasture. Many communities are built at least partly on soils of this association.

Hinckley-Windsor-Deerfield association: Nearly level to very steep, excessively drained and moderately well drained gravelly and sandy soils; on terraces, kames and eskers.

- Hinckley soils are excessively drained. They formed in gravel and sand deposits.
- Windsor soils are excessively drained. They formed in thick sand deposits.
- Deerfield soils are moderately well drained. They formed in sand deposits. These soils are in shallow depressions where the water table rises to near the surface during the wet season.

Among the minor soils are scattered spots of **Gloucester and Naumburg soils**.

- The main limitation of soils of this association for community development is the potential pollution hazard to ground water from subsurface sewage disposal systems. Doughtiness and low natural fertility are the main limitations for farming. The soils in about one-third of the area are steep enough to have an additional moderate to severe hazard of erosion.
- Most of this association is wooded, but some is in idle fields or pasture. Many communities are built at least partly on soils of this association.

Greenwood-Chocorua-Naumburg association: Nearly level, very poorly drained organic soils and somewhat poorly drained sandy soils; along broad drainage ways and in depressions.

- Greenwood and Chocorua soils are very poorly drained. They formed in mucky peat deposits that vary in thickness. Chocorua soils are 16 to 51 inches thick over sand or gravel, and Greenwood soils are more than 51 inches thick. These soils are in depressions where the water table is at or near the surface most of the time.
- Naumburg soils are somewhat poorly drained. They formed in thick sand deposits. These soils are on slightly elevated positions adjacent to the wetter organic bogs on terraces and lake plains.

- The main limitation of soils in this association for most uses is the long duration high water table. The poor stability and shear strength of organic material is an added limitation of the organic soils.
- This association is in woods and open bogs. The excessive wetness and lack of adequate drainage outlets favor development for wetland wildlife habitat. Where areas are filled for roads, the organic material must be removed to reduce subsidence and improve stability.

Paxton-Woodbridge-Ridgebury association: Nearly level to moderately steep, well drained, moderately well drained, poorly drained and somewhat poorly drained loamy soils that have a pan layer; on uplands.

- Paxton soils are gently sloping to moderately steep and well drained. They formed in loamy glacial till. These soils have a loamy pan layer at a depth of 16 to 36 inches. They are commonly in the convex upper positions on the landscape. Stones are common on and below the surface.
- Woodbridge soils are gently sloping and moderately well drained. They formed in loamy glacial till and have a pan layer at a depth of 18 to 36 inches. These soils are on the lower concave slopes. Stones are common on the surface.
- Ridgebury soils are nearly level to gently sloping, poorly drained, and somewhat poorly drained. They formed in loamy glacial till and have a pan layer at a depth of 10 to 25 inches. These soils are in depressions and drainage ways.
- The major limitations of soils in this association for most farm and non-farm uses are a seasonal high water table, the pan layer and stoniness. If cleared of protective cover, most soils of this association have a moderate to severe hazard of erosion.

Millis-Scituate-Ridgeury association: Nearly level to moderately steep, well drained and moderately well drained soils that have a sandy pan layer, and poorly drained and somewhat poorly drained soils that have a loamy pan layer; on uplands.

- Millis soils are gently sloping to moderately steep and well drained. They formed in loamy glacial till and have a sandy pan layer of 18 to 36 inches. These soils are in convex upper landscape positions.
- Scituate soils are gently sloping to sloping and moderately well drained. They formed in loamy glacial till and have a sandy pan layer at a depth of 18 to 30 inches. These soils are in a concave intermediate landscape positions between well-drained Millis soils and poorly drained Ridgebury soils.
- Ridgebury soils are nearly level to gently sloping, poorly drained, and somewhat poorly drained. They formed in glacial till and have a loamy pan layer at a depth of 10 to 25 inches. These soils are in the low depressions and drainage-ways on uplands.
- The major limitations of soils of this association affecting most farm and non-farm uses are a seasonal high water table, the pan layer and stoniness. Cleared areas are susceptible to erosion.

Hollis-Gloucester-Charlton association: Gently sloping to very steep, somewhat excessively drained to well-drained to well-drained loamy and sandy soils that are shallow to deep over bedrock; on uplands and mountains.

- Hollis soils are gently sloping to very steep and somewhat excessively drained. They formed in loamy glacial till less than 20 inches thick over bedrock.
- Gloucester soils are gently sloping to very steep and somewhat excessively drained. They formed in stony glacial till. These soils are on hills and mountainsides below high ridges.
- Charlton soils are gently sloping to moderately steep and well drained. They formed in loamy glacial till. These soils are on the smoother landforms and in deep soil areas closely associated with the Hollis soils.
- The main limitations of soils of this association for most farm and non-farm uses are shallowness to bedrock, rockiness, steepness of slope and stoniness. Most of this association is wooded, but a few small tracts are in pasture or are idle.

(Source: *Soil Survey of Carroll County, New Hampshire*, USDA-Soil Conservation Service and Forest Service & NH Agricultural Experiment Station, 1977

8.4 TOPOGRAPHY

Topography describes surface features of the land in terms of shape, relief and relative positions of natural features. Topography is usually expressed as elevation (height above mean sea level) and slope (change in vertical distance over horizontal distance). Topography affects several natural processes, such as climate, drainage, erosion, wind patterns and vegetative growth, in turn affecting human activities.

Effingham‘s topography is a mixture of various terrain features. Effingham has extensive steep slopes in the area of the Green Mountain range and in several smaller areas about Town. The mountain area varies in elevation from approximately five hundred (500) feet to eighteen hundred and eighty-four (1884) feet at the summit of Green Mountain.

Effingham has extensive wetland areas, contiguous to rivers, streams and ponds in Town. Otherwetland areas also exist in Town that are not contiguous to water bodies. The wetland areas are at elevations roughly between four hundred (400) and five hundred (500) feet.

The remainder of the Town is generally rolling topography, with some flatter arable areas.

8.5 SLOPE

Slope is the amount of rise or fall in feet for a given horizontal distance and is expressed in percent. A 6% slope means that for a 100-foot horizontal distance the average rise or fall in height is six (6) feet. The slope of the land can have a great effect on development, and percent slope can greatly influence the economic and physical feasibility of development. The steeper the slope, the more it will cost for septic systems, driveways, foundations, etc. Additionally, as the slope increases so does the potential for an increase in erosion, storm-water runoff, and nutrient

movement. Poor soil conditions combined with steep slopes can present significant development constraints.

Effingham‘s mountain areas have slopes mostly of 15-35%. The rolling areas have slopes of 8-15%. Slopes in and around the remaining areas including wetlands are from 0-8%.

8.6 WILDLIFE AND HABITATS

Wildlife is considered a significant natural resource within the town, a resource dependent upon the land base for habitat. Individual species rely upon many different and specific habitat types for their survival, but the most critical habitats are water resources, including wetlands, riparian habitats, and large blocks of connected undeveloped habitat blocks and the connectivity corridors between those blocks. Effingham has an abundance of all three critical habitats and planning and development for the town should reflect the value of protecting those habitats. Because habitat is so important to wildlife, the Effingham habitats which support its abundant and varied wildlife are covered extensively in this section.

The majority of Effingham is upland habitat of the Hemlock-Hardwood-Pine Forest type. Thus, the five most common habitat types in Effingham are the following:

Hemlock-Hardwood-Pine-ex--Pine River-Green Mountain and surrounding areas
Peatlands-ex.--Wilkinson Swamp and Heath Pond Bog
Floodplain Forests-ex.--along the Ossipee and Pine Rivers
Wet Meadow/Shrub Wetlands-ex.--along the South River and north Province Lake
Pine Barrens-ex.--along Rt. 25 and southern Pine River

Additional habitat types occurring in Effingham include the following:

Northern Hardwood-Conifer forest-ex.--atop higher elations of Green Mountain
Lowland Spruce-fir forest-ex. -- mid-range areas of Green Mountain
Grasslands-ex.--areas along Rt. 153 and Simon Hill Road
Shrublands-ex.--Wilkinson Swamp and northern area of South River
Vernal Pools-ex.--along Pine and Ossipee Rivers

Table 9: Effingham Wildlife Habitat Land Cover

	Acres	% of Total
Hemlock-Hardwood-Pine	20,876	79.6
Peat Lands	1,850	7.1
Forest Floodplain	1,700	6.5
Wet Meadow/Shrub Wetland	680	2.6
Pine Barrens	588	2.2
Northern Hardwood-Conifer	288	1.1
Lowland Spruce-Fir	169	0.6
Grasslands	87	0.3
Cliffs	0	0
Rocky Ridges & Talus Slopes	0	0
High Elevation Spruce-Fir	0	0

Source: Wildlife Habitat Land Cover, *Wildlife Action Plan*, NH Fish & Game Department, October 2005)

Additional habitat information can be found in Figure 4.

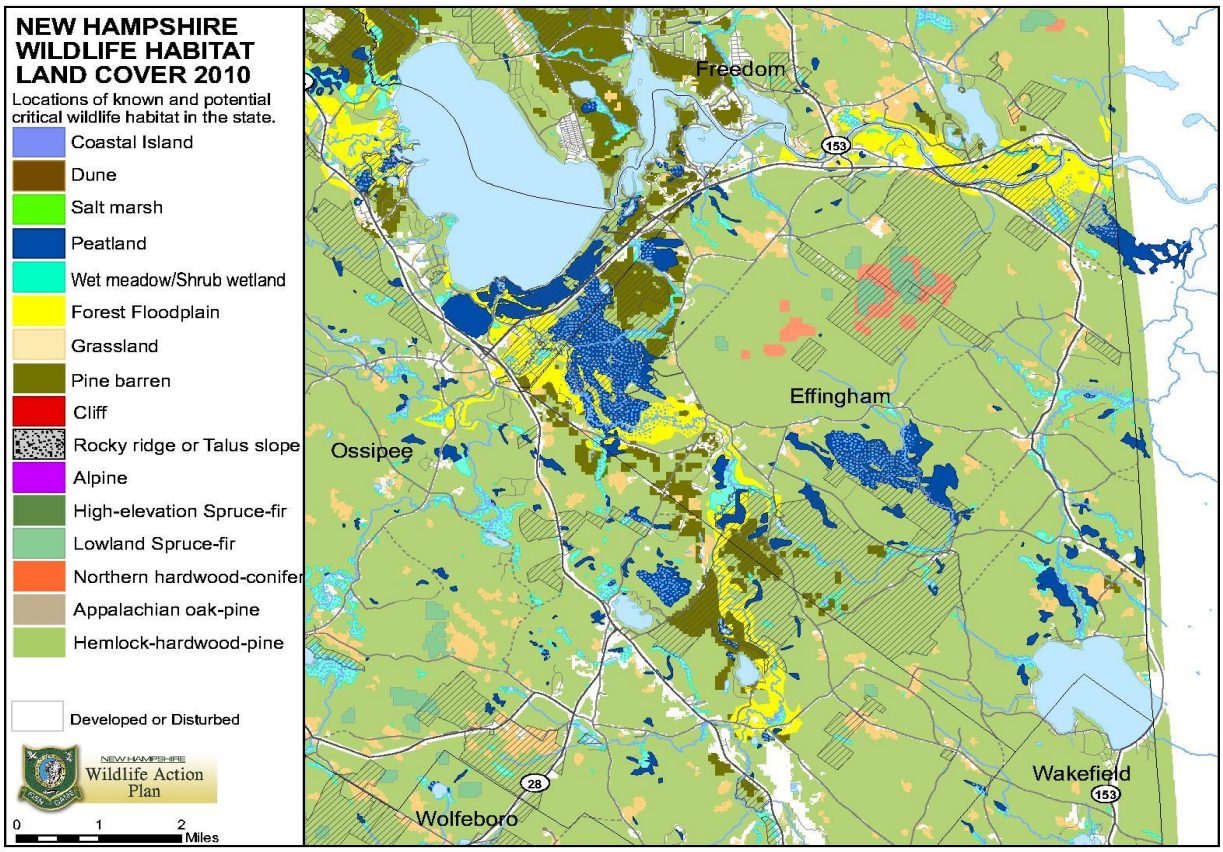


Figure 4: NH Wildlife Habitat Land Cover 2010

Using Geographic Information Systems (GIS) data, New Hampshire Fish and Game (NHFG) biologists developed models of habitat for Figure 4. It was not possible to go everywhere in the state to see which habitats were where. It is possible to predict where habitats would be, based on known information. This known information included soils, elevation, climate, landforms, and broad vegetative classes. Based on this data, NHFG predicted the type of vegetation that would grow at that particular location. Additionally, NH Natural Heritage Bureau supplied natural community's data. The NH Land Cover data, which shows locations of various categories of developed and undeveloped land, was also used as well as the National Wetlands Inventory data for wetlands.

8.7.1 HABITATS

8.7.1.1 HEMLOCK-HARDWOOD-PINE FOREST

Effingham is primarily a Hemlock-Hardwood-Pine forest habitat. Colcord Hill, Green Mountain, Rumney Hill, and town lands on Hobbs Road are examples of this habitat. Hemlock- Hardwood-Pine forests provide habitat for wildlife.

Some common wildlife in this habitat include the following: Whitetail deer, Moose, Coyote, Fox, Turkey, Black bear, Ruffed grouse,Great horned owl, Wood snake, Garter snake, and Barred owl.

Hemlock-Hardwood-Pine forests also provide great recreation opportunities, including:

Hunting	Fishing	Hiking
Bird watching	Snowmobiling	Snowshoeing

Most of Effingham's Hemlock-Hardwood-Pine forests are privately owned. Some are managed for timber.

Hemlock-Hardwood-Pine forest habitat is important because the forests offer a wide variety of trees and food sources for all animals. In addition, these areas offer cover, perching and nesting sites for birds.

8.7.1.2 PEATLANDS

Peatlands are wetland ecosystems that contain peat – a spongy organic material formed by partially decayed wetland plants. The water in many peatlands is highly acidic and lacking nutrients, creating distinct growing conditions for Sphagnum moss, leatherleaf and bog laurel. Sedge grass and shrubs dominate less acidic peatlands.

Types of peatlands are:
- Bogs, which receive very little surface water and are among the most acidic peatlands.
- Fens, which are associated with moving water either along a river, lake or with a stream that flows into or out of the peatland.
- Peat swamps, which are are peatlands dominated by trees.

Effingham is fortunate to have a number of peatlands, some are quite large. Effingham peatlands are found primarily in the Heath Pond Bog, Upper Pine River, Wilkinson Swamp, Upper Province Lake, and Ossipee River Habitats.

The following critical wildlife species are found statewide in peatlands: Hoary comma, Blanding's turtle, Mink frog, Eastern towhee, Spruce grouse, Ribbon snake, Rusty blackbird, Ringed boghaunter, Palm warbler, and Spotted turtle.

Peatlands are important because they add significantly to wildlife diversity. At least 550 different plants are found in New Hampshire peatlands. These areas also provide habitats for endangered plants, and animals.

8.7.1.3 FLOODPLAIN FOREST

Floodplain Forests occur near rivers, temporary wetlands, meadows, and dense shrub thickets. The periodic flooding that is characteristic of this habitat deposits nutrient-rich sand and silt for trees and plants to support wildlife. Effingham's Floodplain Forests can be found in the following areas: the Ossipee and Pine Rivers, and in and around the Heath Pond Bog.

Plant types in this habitat include the following:

Red maples	Sugar maples	Balsam fir
Black ash	Sycamore	River birch
Ironwood	Cottonwood	Black cherry oxbow
Shrub thickets	Wildflowers	Ferns

Wildlife species found in Floodplain Forests include Baltimore oriole, Otter, Belted kingfisher,
Red billed woodpecker, Blue-gray gnatcatcher, Yellow throated vireo and Green heron.

Floodplain Forest habitat is important because it creates rich insect and amphibian breeding areas. These insects and amphibians become prey for birds.

8.7.1.4 WET MEADOW/SHRUB WETLANDS

Wet Meadow/Shrub wetlands habitats encompass a variety of wetland types, each with different vegetation, and have one thing in common: the soils in each are wet most of the year.

Types of marsh and shrub wetlands are:
- Wet meadows, which are are filled with sedges and grasses. Wet meadows may not be flooded all year, but are wet for long periods in spring and summer.
- Marshes, which contain plants that grow out of the water, but their roots are wet, such as cattails, pickerelweed, and water lilies.
- Shrub wetlands, which are thickets of shrubs and young trees growing out of wet soils. These areas often flood in the spring.

Wet Meadow/Shrub wetlands are found primarily along the Pine, South, and Ossipee Rivers as well as the north and eastern side of Province Lake in Effingham.

Wildlife species include a wide variety of turtles, snakes, ducks, rabbits, and birds.

Wet Meadow/Shrub wetlands are important because they are rich habitats providing a number of critical ecosystem functions such as flood control, pollutant filtration, erosion control and wildlife habitat. Marshes are important breeding areas for fish, waterfowl, and amphibian breeding. Shrub wetlands may seem inhospitable to people, but their dense thickets provide reliable cover from predators for many species.

8.7.1.5 PINE BARRENS

Pine barrens are rare, fire-dependent natural communities supporting unique plants and creatures. Technically known as pitch pine – scrub oak woodlands, pine barrens are one of New Hampshire's rarest natural communities. Formerly covering more land area in the state, they have been reduced by forestry that favored commercial species like white pine. Large tracts were found in the Ossipee River watershed, which includes Effingham. Examples of pine barrens are west of the Pine River and in surrounding areas of the Heath Pond Bog area.

Pine barrens are characterized by a high percentage of pitch pine and some red pine as the dominant large tree species. Beneath these trees grow smaller scrub oaks and low-growing shrubs such as blueberries. Grassy openings may feature blue lupine and other herbaceous plants. Pine barren plants have adapted to resist fire so periodic burning clears away other types and maintains the balance in the ecosystem.

More than 50 rare plant and animal species rely on pine barrens. These include the Whip-poor-will, Eastern towhee and Karner Blue butterfly, as well as many lesser-known species of moths.

Pine barrens are important because they frequently are located on top of stratified drift aquifers like the Ossipee Aquifer that underlies much of Effingham. Thriving natural communities provide the best filtration for water percolating in to recharge vital drinking water supplies. Vegetative cover and lack of development provide a defense for pure water supplies in this habitat.

8.7.1.6 NORTHERN HARDWOOD-CONIFER FORESTS

Typically found on well-drained fertile slopes with elevation between 1500 and 2500 feet, northern hardwood-conifer forests contain sugar maple, American beech, and yellow birch as the dominant species of trees. Striped maple, witch hazel, and hobblebush shrubs are typical in the understory with wild sarsaparilla, starflower, and blue-bead lily on the forest floor. The best examples of northern hardwood-conifer forests have stands of large trees in the canopy, young trees in the understory, many standing dead trees, and abundant dead or decaying trees on the ground. Large cavity trees, pockets of wetlands, seeps and interspersed patches of conifers make some areas of northern hardwood-conifer forest especially rich for wildlife.

This habitat is found in Effingham only at the higher elevations of Green Mountain.

Examples of wildlife species in this habitat are the Wood thrush, Bobcat, Black bear, Flying squirrel, grey fox, Mink frog, Pileated woodpecker, Ribbon snake, and Blue spotted salamander.

Northern Hardwood-Conifer Forests are important because many of these forests remain unfragmented by development and roads, making them an important ecological refuge for plants and animals. These forests provide habitat for hundreds of species of wildlife, including forty-two mammals and seventy-three birds.

8.7.1.7 LOWLAND SPRUCE-FIR FORESTS

Lowland Spruce-Fir Forest habitat usually occurs in elevations between 1000 and 2500 feet on poor soils such as rocky ridges. Red spruce and balsam fir are the dominant trees, often mixed with yellow and paper birch. Hobblebush, bunchberry, and blueberry are found on the forest floor. The lowland forests are less stressed by the cold and dry conditions of higher elevations, and support larger trees creating a more diverse community of plants and animals.

Examples of this habitat are limited to small mid-range areas of Green Mountain.

Lowland spruce-fir forests are habitat to the American marten, Hoary bat, Cooper's hawk, Black bear, Northern bog lemming, Bald eagle, and the Black backed woodpecker.

Lowland Spruce-Fir Forest is important because New Hampshire lies at the southern edge of the range of spruce-fir forests in North America. As a result, this habitat supports over fifty wildlife species that do not occur together in most other parts of the eastern U.S.

8.7.1.8 GRASSLANDS

Grasslands habitats are commonly agricultural fields such as hayfields, pastures, and fallow fields. Here vegetation consists of a mixture of grass species, sedges and wildflowers. More than seventy species of wildlife use open areas of fields and wildflowers to meet their needs for food, cover and breeding. Today, humans maintain most grasslands in Effingham. If left alone, these habitats will grow back with shrubs and small trees, reverting eventually to forest.

Grassland examples are found primarily at old farms where the landowners still maintain their fields by mowing. Examples are found along Town House Road, Simon Hill Road and Rt. 153.

Wildlife species found in grasslands are Eastern meadowlark, Bobolink, Whip-poor-will, White tail deer, Wood turtles, Northern leopard frog, Smooth green snake and Eastern hognose snake.

Grasslands are important to a wide variety of species that require open spaces and grassland nesting birds. Smaller than five acre grasslands are still important for many species as foraging areas for nesting birds in nearby larger fields or for migrating birds passing through this area.

8.7.1.9 SHRUBLANDS

Shrublands habitats are usually temporary, existing on the land for a relatively short period of time. If an open field is left un-mowed, for just a few years, shrubs and young trees will start to grow, shading out grasses and wildflowers. Within twenty-five to thirty years, the area that was once a field will become a young forest.

Whether the shrubland habitat develops because of human activity or is naturally occurring, shrublands are in patches throughout Effingham. Naturally occurring examples are in Wilkinson Swamp and along South River as it crosses Snow Road.

Shrublands are a vital habitat to the American woodcock, Eastern towhee, Bobcat, Moose, Eastern box turtle, Golden-winged warbler, Ruffed grouse, and New England cottontail.

Shrublands are important because of the dense growth which provides good cover for wildlife. The shrubs and young trees provide an abundance of fruits and berries, eaten by many birds and animals.

8.7.1.10 VERNAL POOLS

Vernal pools are wetlands with a seasonal cycle of flooding and drying. Some vernal pools flood in the spring with water from melting snow, rain or high groundwater and then typically dry out be summer's end. Other pools follow a similar pattern, but fill with rain in the autumn, hold water all winter and spring, and then dry out by late summer. The annual drying cycle of vernal pools play a key role in determining what wildlife species uses which pools as habitat. Vernal pools can exist almost anywhere-in forests, fields, shrub swamps, marshes, or in gravel pits. They can be smaller than one-tenth acre or larger than two acres. Some sunnier pools may contain sphagnum moss, sedges, ferns and shrubs such as high-bush blueberry or buttonbush. Red maple and eastern hemlock commonly grow on the edges of these pools. Dry vernal pools can often be identified by the presence of dark, matted leaves within a depression in the ground. Examples of vernal pools can be found along the Pine and Ossipee Rivers.

Vernal pools are important because they provide key breeding habitat for amphibians. In the spring, these amphibians migrate from nearby woodlands to vernal pools where they breed and deposit their eggs. Once hatched, tadpoles and larvae develop quickly into young frogs and salamanders. Other species such as fairy shrimp, turtles, Spring peepers, Damsel & Dragonflies also use this type of habitat.

8.7.1.11 WILDLIFE SPECIES

The New Hampshire Wildlife Action Plan (WAP), which was mandated and funded by the federal government, identifies statewide strategies for identifying, restoring and maintaining critical habitats and populations of wildlife species of conservation and management concern. This watershed is home to a third of the state's wildlife species of conservation concern. Please refer to

http://www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/WAP_pieces/WAP_Chapter_2.pdf for a listing. In addition, a list of species, by town, is available from NH Natural Heritage Inventory at *http://www.dred.state.nh.us/divisions/forestandlands/bureaus/naturalheritage/listsforms.htm*.

In 2007, the Effingham Conservation Commission received a New Hampshire Mooseplate Grant to inventory the wildlife in Effingham with the Wildlife Action Plan. This data collected by Dr. Rick Van de Pol, of Ecosystem Management Consultants, provided Effingham with a baseline of wildlife information.

Dr. Van de Pol used information from the 2005-2007 Effingham Wetland Inventory & Protection Project to update habitat maps, plot known occurrences of rare wildlife species, and locate the best wetland wildlife habitat in town. Selected field excursions into previously unvisited upland habitat areas, as well as a careful review of aerial photography were used to provide an initial estimate of the best upland habitat areas in Effingham. A total of 3141 acres of wetlands and 12,043 acres of uplands were initially identified as the best habitat areas.

Below are the threatened wildlife observed by Dr. Rick Van de Pol during the 2007-2009 Wildlife Action Plan Implementation Project in Effingham.

- **Mammals:**
  Bobcat
- **Birds**:
  Great Blue Heron, Eastern Towhee, Ruffed Grouse, Bald eagle, Purple Finch, Rusty Blackbird, Purple Finch, Canada Warbler, Palm warbler, Common nighthawk, American black duck, Common loon, Whip-poor-will, American bittern, Cooper's hawk, American woodcock
- **Fishes:**
  Brook trout, Burbot, Bridle shiner
- **Turtles:**
  Spotted turtle, Blanding's turtle
- **Amphibians:**
  Blue-spotted salamander
- **Odonates** (Dragonflies):
  Martha's pennant, White corporal, Ski-tailed emerald, Maine snaketail, Brook snaketail
- **Lepidoptera** (Moths):
  Xylotype capax, Nepytia pellucidaria, Zale sp.1

For a complete list of non-threatened wildlife in Effingham, please refer to the species listings in the 2007-2009 Wildlife Action Plan Implementation Project.

8.7.1.12 WILDLIFE AND HABITAT CONSERVATION

The protection of critical and endangered wildlife is an important purpose of conservation in Effingham. This should be pursued through conservation planning and management and achieved through voluntary land conservation. Effingham's large unfragmented tracts of land are important for the wildlife species which make their home in Effingham. Preservation of these

tracts, where possible, and the connection of contiguous conservation parcels which allow wildlife to roam through continuous forest cover are important. In addition, the wetlands areas that comprise approximately 25% of Effingham are especially important as wildlife habitat.

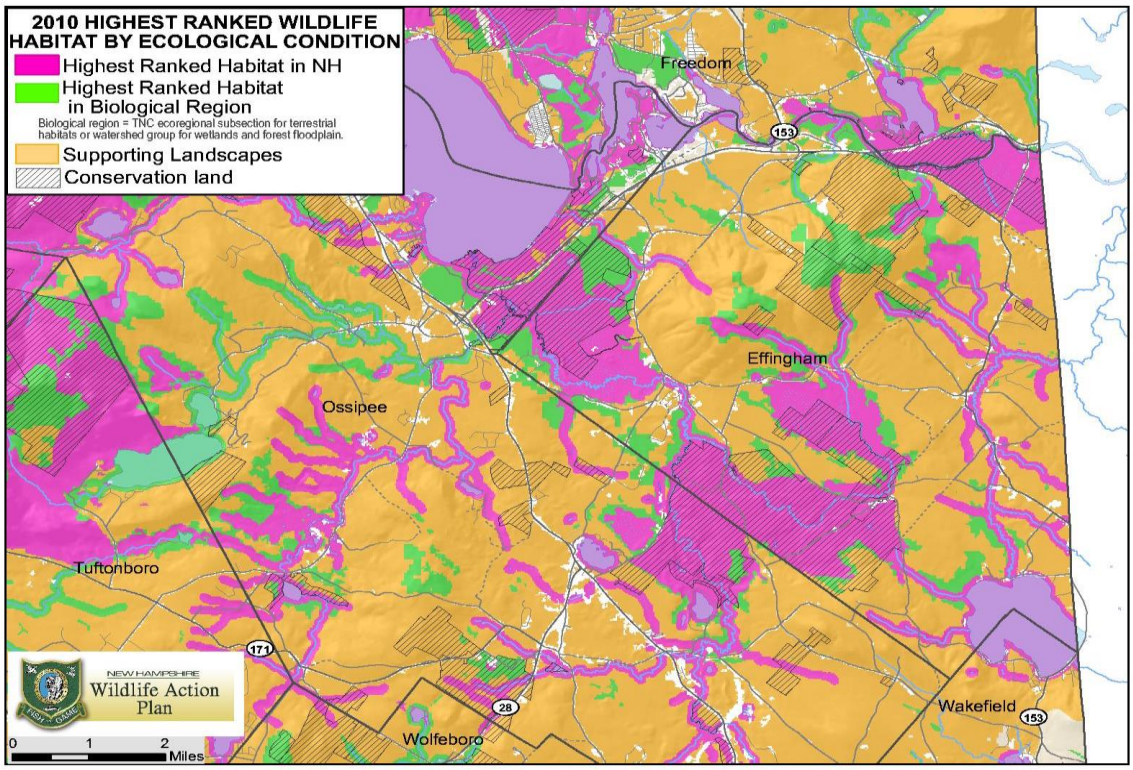
Wildlife habitat conservation actions provide many societal benefits, such as clean air and water, species diversity, sustainable economic growth, protection of flood retention areas and preserving the rural character of New Hampshire. The Ossipee Watershed encompasses some of the highest ranked wildlife habitat by condition in the State of New Hampshire, but falls below the statewide town-average for percent in conservation. Table 10 provides this information.

Table 10: Summary of Effingham Top-Ranked Wildlife Habitat by Ecological Condition (NH Wildlife Action Plan spatial data – October 2006)

		Conserved	
	Acres	Acres	%
Effingham – Total Area	25,556		
Effingham – Total Land Area	24,827		
Tier 1 (Highest Ranked Wildlife Habitat in NH-30.5%)	7,788	2,668	34.3
Tier 2 (Highest Ranked in Biological Region)	768	372	48.4
Tier 3 (Supporting Landscape)	14,878	2,143	14.4

Figure 5 shows Effingham highest ranked habitat map. Effingham is most fortunate to have several areas of highest ranked habitat in NH and highest ranked habitat by biological condition. As seen in Table 10, above, a good percentage of these habitats are under conservation.

Figure 5: 2010 Highest Ranked Wildlife Habitat



New Hampshire Wildlife Action Plan. October 2005. NH Fish and Game Department, in cooperation with conservation partners. *http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm*)

The Natural Resources Inventory, which was prepared by the Effingham Conservation Commission, should be used as a basis for identifying and protecting critical and endangered wildlife species and the habitat that supports them. Five areas in Effingham have been recognized and are considered priority conservation areas, as seen in Figure 6. These areas are where critical and endangered wildlife are most likely to be found. The following priority conservation areas include several habitat types.

Area A-Heath Pond Bog area – peatland, pine barren, floodplain forest, hemlock-hardwood-pine, and grassland habitats

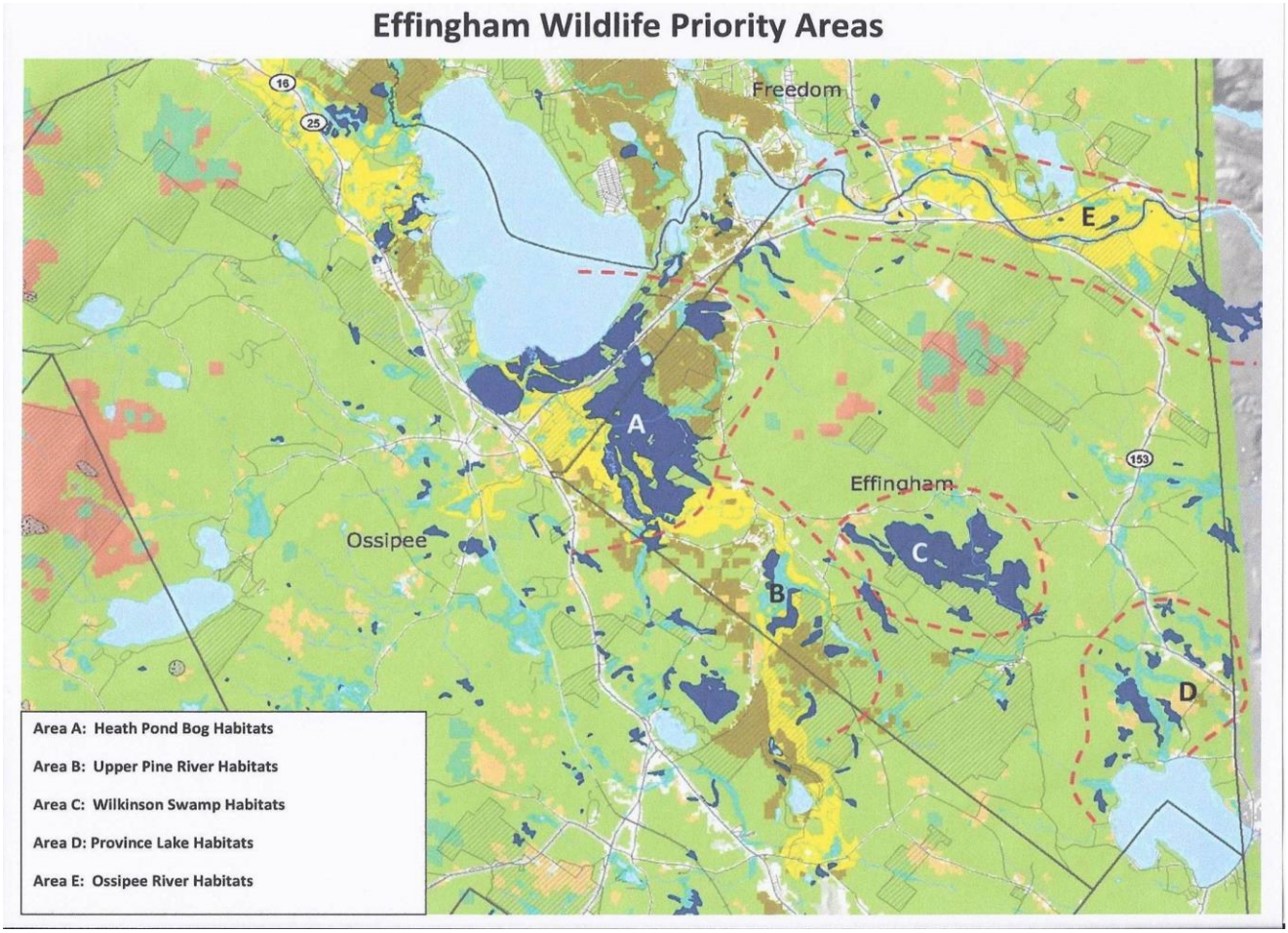
Area B-Upper Pine River area --floodplain forest, peatland, pine barren, marsh and shrub wetland, hemlock-hardwood-pine, and grassland habitats

Area C-Wilkinson Swamp area – peatland, hemlock-hardwood-pine, wet meadow/shrub wetland, and grassland habitat

Area D-Province Lake area – peatland, hemlock-hardwood-pine, wet meadow/shrub wetland, pine barren, and grassland habitats

Area E-Ossipee River area – floodplain forest, peatland, wet meadow/shrub wetland, grassland, and hemlock-hardwood-pine habitats.

Figure 6
(Sources: *Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns.* NH Natural Heritage Bureau. 2007;*http://www.dred.state.nh.us/divisions/forestandlands/bureaus/naturalheritage/documents/web_towns_001.pdf New Hampshire Wildlife Action Plan. October 2005*. NH Fish and Game Department, in cooperation with conservation partners. *http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm*)



8.7.1.13 CONSERVATION TYPES

Voluntary conservation easements are legally binding agreements between a landowner and a conservation easement, which limits use of the land in perpetuity. The landowner retains ownership of the land.

Under **Fee Acquisition**, the landowner sells or donates full ownership of their land to a conservation organization.

Other objects with more limited legal protection for the land include **Deed Restrictions** and **Covenants**.

8.8 SCENIC RESOURCES

It has often been said that Effingham is a small town with a mountain in the middle. Green Mountain stands at 1884 feet with five tops (see figure 4). It also has several hiking trails that lead to the fire tower at the summit. The South River, which starts at an outflow from Province Lake, runs north to the Ossipee River. Fishing is a popular pastime. The Larry Leavitt Preserve, on NH State Route 153, offers benches and a bird watching platform. Other bird watching opportunities can be found at the Audubon Watts Sanctuary, Pine River State Forest and Wilkinson Swamp.

Scenic resources can be found by simply taking a bicycle or vehicle ride around Effingham. Many views of Green Mountain are available as well as scenic open fields, centuries old homes, barns, and stonewalls created by early residents of Effingham.

Seasonal sports, such as snowshoeing and cross-country skiing, are enjoyed in the winter.

Nature is all around us in Effingham.

Table 11: Conservation Land in Effingham

Conservation Lands in Effingham

Name	Tax Map Map #	Lot #	Acres	Location	Primary Protection Agency
Watts Wildlife Sanctuary	404	18	263.00	Huntress Bridge Road	Audubon Soc of NH
Little Property - Watts Wildlife Sanct.	404	20	133.00	Huntress Bridge Road	Audubon Soc of NH
Stephanie Barnes Cons. Easement	404	5	86.14	330 Province Lake Road	Audubon Soc of NH
NRCS WRP Seabury	404	22	44.00	8 Huntress Bridge Road	USDA, Nat Res Consrv Serv
Wilkinson Brook Preserve	412	20	49.77	Town House Road	Nature Conservancy
Moulton Tract	412	40	64.21	Wilkinson Swamp Rd	Nature Conservancy
Moulton Tract	412	48	137.35	Off Forest View Drive	Nature Conservancy
Charlie Watts Tract	202	1	1034.93	Province Lake Road	Soc Protection NH Forests
Dwight Mills Addition	405	11	83.73	Highwatch Road	Soc Protection NH Forests
Dwight Mills Addition	405	12	594.50	Highwatch Road	Soc Protection NH Forests
Patricia Watts Addition	409	10	61.00	Off Town House Road	Soc Protection NH Forests
Dearborn Trail Addition	410	57	84.00	Hobbs Road	Soc Protection NH Forests
196 Huntress Bridge Road	403	9	9.00	196 Huntress Bridge Rd	Green Mtn Conserv Group
Varrieur	404	17	24.00	Province Lake Road	Audubon Soc of NH
Green Mountain Natural Area	201	1	41.09	Green Mountain Road	Green Mtn Conserv Group
Nath Easement	412	58	309.00	Off Granite Road	Nature Conservancy
Leavitt Easement	203	30	59.00	Plantation Road	Green Mtn Conserv Group
Green Mountain State Forest	405	1	17.00	Green Mountain	NH Dept of Res&EconDev
Heath Pond Bog Natural Area	408	20	503.00	Off Rte 25	NH Dept of Res&EconDev
Heath Pond Bog Natural Area	407	46	145.00	Off Rte 26	NH Dept of Res&EconDev
Pine River State Forest	413	15	345.00	Hutchins Pond Road	NH Dept of Res&EconDev
Pine River State Forest	416	32	1014.00	Wilkinson Swamp Rd	NH Dept of Res&EconDev
Pine River State Forest	416	21	720.00	Wilkinson Swamp Rd	NH Dept of Res&EconDev
Town of Effingham Property	106	12	1.06	Lake Shore Drive	Town of Effingham (ECC)
Town of Effingham Property	106	14	0.21	Lake Shore Drive	Town of Effingham (ECC)
Town of Effingham Property	202	24	0.46	Province Lake Road	Town of Effingham (ECC)
Town of Effingham Property	202	25	0.36	Province Lake Road	Town of Effingham (ECC)
Town of Effingham Property	410	75	14.50	Province Lake Rd (LLP)	Town of Effingham (ECC)
Town of Effingham Property	410	77	0.34	Off Province Lake Rd	Town of Effingham (ECC)
Town of Effingham Property	412	16	45.00	Off Town House Road	Town of Effingham (ECC)
Town of Effingham Property	412	21	54.00	Off Town House Road	Town of Effingham (ECC)
Town of Effingham Property	413	19	10.30	Off Drake Road	Town of Effingham (ECC)

8.9 NATURAL RESOURCES GOALS

Natural resources goals should consider the percentage of land remaining in Effingham that remains economically viable for residential and commercial use when proposing new or increased land use regulations.

8.9.1 CONTIGUOUS OPEN SPACE

1. Pursue land protection opportunities that create corridors of contiguous open space between currently protected lands.
2. Promote the preservation of frontage where large blocks of open space and wildlife corridors cross roadways.
3. Pursue conservation easements, or other forms of protection, on lands adjacent to permanently protected parcels to preserve contiguous corridors of undeveloped land.
4. Partner with other conservation based organizations (The Nature Conservancy, Society for the Protection of New Hampshire Forests, New Hampshire Audubon, Green Mountain Conservation Group), working in Effingham and the region to increase funds, reach a wider audience, prioritize parcels for protection, and pursue land protection efforts to the benefit of the community and the region.
5. Consider bond money for conservation purchases, when and where appropriate.

8.9.2 MOUNTAINS

1. Highlight health, safety and environmental concerns and related impact on town financial resources when steep slope and high elevation development is proposed.
2. Explore a ridgeline development ordinance to limit the impact of developments at higher elevations.
3. Identify viewshed areas of high value and encourage open space or conservation subdivision in those areas.
4. Review and update site plan regulations to ensure that the steep slope development regulations are reinforced to reduce the impact on steep slopes.
5. Review and update the regulations relative to erosion and sediment control to ensure these follow the most current “best management practices” (BMPs).
6. Review and update the regulations relative to earth excavation regulations to ensure they protect natural resources more effectively.

8.9.3 RURAL AREAS

1. Base lot sizes in the rural areas of town on land capability, existing natural resources, and the distinct character of the district.
2. Review the existing conservation subdivision ordinance.
3. Pursue protection of the limited agricultural land in town
4. Continue making Effingham’s land use regulations “farm friendly.”

8.9.4 WILDLIFE AND HABITAT RESOURCES

1. Promote the use of BMPs in all logging operations.
2. Identify and consider forest and habitat zones which contain valuable resources.
3. Consider efforts to secure conservation easements on undeveloped land with significant natural resources and on town lands that are environmentally sensitive.
4. Encourage landowners to develop stewardship plans.
5. Preserve corridors between habitats and protected open space, particularly along waterways to help wildlife find access to food, shelter, water, and breeding areas without conflict with human activities.
6. Develop a course of action following the New Hampshire Wildlife Action Plan (WAP) and specific findings in Effingham. Coordinate efforts in Effingham with statewide strategies for identifying, restoring and maintaining critical habitats and populations of wildlife species of concern.
7. Use the community-owned resource of town forest as a great educational asset to demonstrate long-term stewardship and management. The town's active land management and work with professional foresters can play an important role in demystifying the process and outcome of responsible management. Town-owned forests could also be managed for recreation.
8. Provide opportunities for the public to learn about and view local wildlife.

8.9.5 WETLANDS AND SURFACE WATERS

1. Support regulations to protect vernal pools and update wetland ordinance.
2. Pursue easements for buffers along South River, Pine River, Ossipee River and Province Lake shore areas in Effingham.
3. Protect riparian corridors, shorelines, and wetlands from incompatible development that could degrade water quality. (http://www.des.state.nh.us/sp.htm). Include consideration of culvert design as wildlife corrdiors.
4. Identify and evaluate potential sources of contamination to surface waters and the aquifer. Routinely monitor water bodies in Effingham through such agencies as Green Mountain Conservation Group and provide remedial mechanism if any problem is identified.
5 Improve the quality of storm water being discharged into surface waters through treatment, or storm water detention. Divert any water flow into vegetated areas. Use drains, swales and water bars.
6. Review impervious surface limits in the site plan review regulations, and encourage the use of pervious surfaces for areas like overflow parking lots to help manage non-point pollution and storm water drainage.
7. Apply BMPs for the maintenance of dirt roads, and for areas adjacent to all roadways.
8. Consider road salt use and implement BMPs for salt storage, road maintenance, and snow dumping to prevent impacts of road salt on surface waters.
9. Promote BMPs regarding the management of vegetation around the lake shoreline.

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8.9.6 DRINKING WATER RESOURCES

1. Promote Low Impact Development (LID) techniques in the site plan review process, which promote infiltration on permeable surfaces.
2. Use BMPs to reduce non-point pollutants from industrial, commercial and residential developments. This includes the proper handling and storage of substances to prevent harmful pollutants from entering surface and groundwater. Conduct BMP surveys regularly at facilities that use more than household quantities of regulated substances.
3. Initiate source water protection programs within public water supply areas.
4. Plan ahead and prepare for an emergency well closing, as well as future water supply needs for the town.

8.10 REFERENCES

Additional reading materials for this chapter may be found in the Appendix to the Master Plan. Those reading materials include the following:

Natural Resources Inventory
2007-2009 Wildlife Action Plan Implementation Project for Effingham
2005-2007 Wetland Inventory and Protection Project for Effingham

8.11 ACKNOWLEDGMENTS

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NH Fish & Game Department
NH Department of Resources & Economic Development
NH Natural Heritage Bureau
Society for the Protection of NH Forests
The Nature Conservancy

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