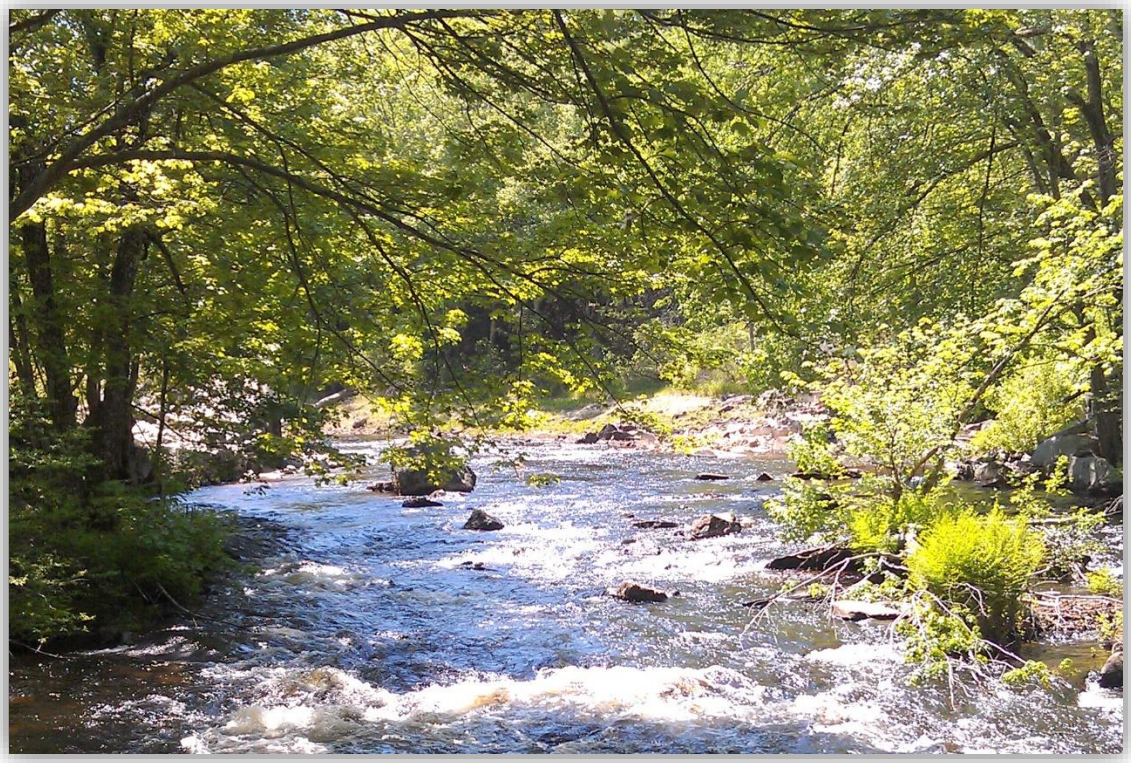
Natural Resources Inventory

Epping, New Hampshire

2017



Prepared by the Epping Conservation Commission
with support from the Rockingham Planning Commission

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Letter from Epping Conservation Commission

May 15, 2017

The Epping Conservation Commission is pleased to present the following Natural Resource Inventory ("NRI") for Epping as of May 2017.

As you can see, the NRI describes the Town's natural resources with maps and explanatory text to help identify areas of high value for wildlife habitat, water quality, recreation, and other resources. Having this information will allow all of us to prioritize protection and take proactive management steps to insure long-term viability of these resources. The NRI also identifies resources threatened by population growth and over-exploitation. The Conservation Commission believes that these steps are important to the Town's future cultural, economic, and community well-being.

You will be able to find maps and other information in the NRI at the Epping Conservation Commission's website EppingOutdoors.com. If you have any questions about any of the information contained in the NRI, please contact one of the Conservation Commissioners at www.eppingoutdoors.com.

We would like to thank the Rockingham Planning Commission and, particularly, its Staff Liaison for Epping, Jennifer Rowden, for their work in funding and creating this document. More information about the Rockingham Planning Commission and its work can be found at www.rpc-nh.org.

We hope you enjoy the information provided herein, as well as Epping's wonderful natural resources!

Sincerely,

John Bennett

Sarah Brennan

Jeff Conrad

Liz Wilson

Scott Pim

Todd Hathaway

Sandy Goodspeed

Introduction

Purpose of the Natural Resources Inventory

The purpose of this Natural Resources Inventory (NRI) is to:

- Map and describe significant natural resources in Epping;
- Identify areas of high ecological value at the local, regional, and state level;
- Recommend options for the protection and management of natural resources in Epping;
- Incorporate relevant reports and studies regarding natural resources in Epping into one document.

Growth and development are critical issues facing Epping. Due to its central location southeast New Hampshire and proximity to the coast and the White Mountains, Epping is an ideal location for access to all these popular areas. The conversion of farm and forestland to residential and commercial use has been a long-term trend. This transformation from a predominantly rural community to a suburban one is taking place across New Hampshire. It is anticipated that the State's population will increase more than 20 percent between 2000 and 2025, with most of the growth occurring in southeastern New Hampshire. Despite this trend, the US Census Bureau showed Epping's population increased from 5,476 in 2000 to 6,411 in 2010. This represents an increase of 17 percent in just 10 years.

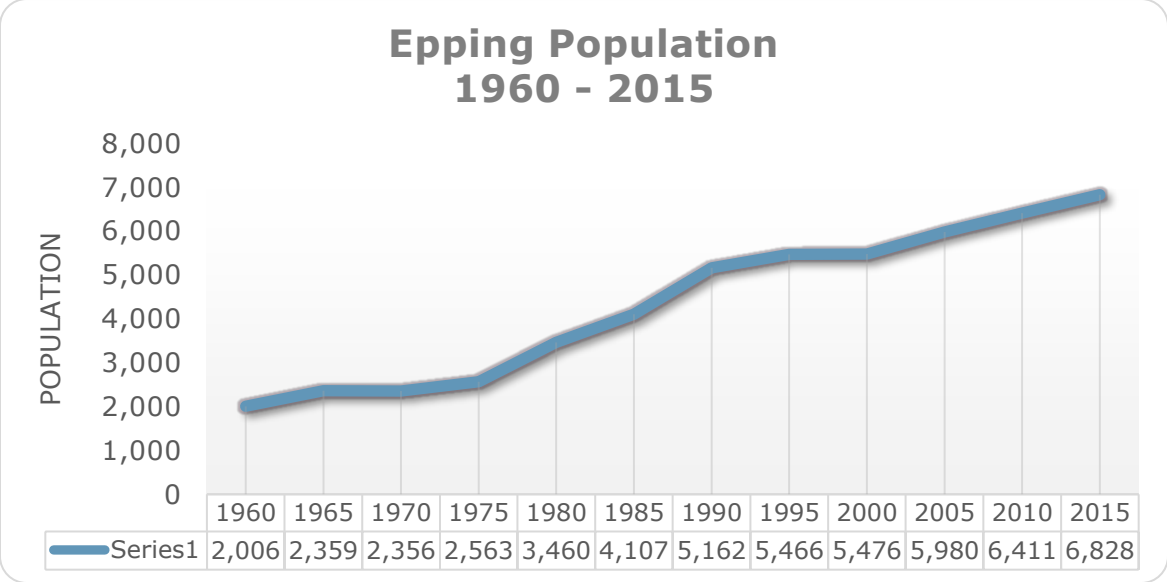


Figure 1: Epping Population Change from 1960 through 2015; NH Office of Energy and Planning and US Census Bureau

Like all communities, Epping is faced with the challenge of finding a balance between growth and the protection of the significant natural resources in the community. The semi-rural and historic character of Epping in combination with rivers, ponds, forests, and farms provides a high quality of life for residents and an excellent habitat for native plants and animals.

Many communities, including the residents of Epping, have acknowledged the impacts posed by growth and development and the need to conserve land for open space, food supply, recreation, wildlife habitat, and the protection of surface and groundwater quality and quantity. One example of this acknowledgement can be found in the 2007 Epping Master Plan, which includes the following statement:

> *"Protecting open space, working farms and forests, and wildlife habitat remains a priority with Epping residents. There should be a connected network of open space woven in among the developed parts of Epping."*

In a recently completed community survey by the Epping Planning Board, residents stated how import natural resources are to the community, with statements such as:

> *"Any large contiguous areas that are currently undeveloped should be considered for protection, with a goal of conserving the greatest habitat diversity."*
>
> *"Conservation land to protect our town's beauty and the health/mental health of its citizens. Allow hunting but protect natural habitats. lease parcels of land to farms for vegetable growth with guarantee of healthy growing practices"*

Given these statements of support for natural resource protection by Epping residents, the Conservation Commission has developed this Natural Resource Inventory to guide and support natural resource protection in town.

Description of Land Use in the Town of Epping

Epping was originally considered part of the town of Exeter as one of the four original town in the state. Epping was among the first townships granted by Governor Benning Wentworth after the separation of New Hampshire from Massachusetts in 1741.

The Town of Epping is located in Rockingham County and encompasses 16,775 acres of land (approximately 26 square miles) and 337 acres of open water (0.2 square miles). Epping is almost entirely in the Lamprey River watershed, with a small portion located in the Exeter River Watershed. Both watersheds are part of the larger Great Bay-Piscataqua River watershed.

Epping is a semi-rural community located in one of the fastest growing regions in the New Hampshire. Given its location at the cross-roads of Route 101 and Route 125, Epping's easy access to Exeter, Manchester, Concord, Portsmouth and the greater Boston region. Statistics from the NH Department of Employment Security show that 63 percent of residents commute to another New Hampshire community and 18.5 percent of residents commute out of state to work (2015).

US Geological Survey Map - Epping 1957

Epping's land use pattern has largely been determined by its natural resources, which intern influenced its transportation and commerce development. The original Europeans settlers of Epping clear areas of forest for timber and to establish agricultural fields. Due to Epping's good soils and many rivers leading to coastal shipping ports, agriculture remained the main industry in the town through the 19th century. The rivers within the town provided both a means of transport for goods and power for the establishment of dozens of mills along the waterways. Large clay deposits along the Lamprey River allowed for the establishment of a brick industry that lasted until the 1970s.

Like many New England towns, downtown Epping developed in the area adjacent to the Lamprey River that is relatively flat and has easy access to water. The road network developed around downtown connecting Epping and the village area of West Epping to adjacent towns. Rail lines running north-south from Worchester, Nashua and Rochester, and east-west from Concord and Portsmouth crossing in Epping also contributed to its development patterns.

Figure 2 illustrates how land use in Epping has changed in the recent past. The general trend has been for an increase in residential, commercial and transportation uses, with a steady decline of agriculture and forested areas as more land us used for development.

Figure 2
Epping Land Use 1962 - 2015
Source: University of New Hampshire, Complex Systems Research Center

Epping Historical Land Use (Acres)								
Land Use Type	1962	1974	1998	2005	2010	2015	2010 to 2015 Total Change	2010 to 2015 Percent Change
Active Agricultural	1,470.1	1,193.1	1,074.8	1,025.7	985.3	980.6	-4.7	-0.5%
Aux Transportation				100.7	100.9	101.3	0.4	0.4%
Farmsteads	41.6	30.5	12.4	118.6	121.0	119.4	-1.6	-1.3%
Forested	13,680.7	13,297.0	12,094.9	9,750.5	9,560.3	9,356.1	-204.2	-2.1%
Industrial/Commercial	106.1	224.1	344.4	265.7	317.8	371.6	53.8	16.9%
Mixed Urban	2.7	13.5	101.8	144.8	164.8	182.0	17.2	10.4%
Open Wetlands	185.2	350.0	314.2	1,849.4	1,849.9	1,850.3	0.4	0.0%
Other/Idle	472.3	538.6	666.6	952.6	898.6	885.5	-13.1	-1.5%
Playing fields / Recreation				74.7	85.2	72.4	-12.8	-15.0%
Railroad								
Residential	585.8	753.2	1,625.5	1,816.2	2,001.8	2,130.6	128.8	6.4%
Transportation	136.9	207.2	232.6	260.9	275.6	305.7	30.1	10.9%
Utilities				80.3	80.3	82.1	1.8	2.2%
Water	94.2	168.4	308.4	335.5	337.1	338.1	1.0	0.3%
Grand Total						**16,775.7**		
**** Note: Years 1962,1974 and 1998 were compiled with a slightly different methodology than 2005, 2010, and 2015. Aux Transportation, Playing Fields and Utilities are categories only broken out in 2005, 2010, and 2015. Classification of wetlands was improved between 1998 and 2005. Due to lesser quality aerial photos many wetlands were classified as 'Forested' before 2005. Many Playing Fields were changed in 2015 to ensure that those in proximity to a school were classified as Education (Industrial/Commercial).**								

See Map 1 - Land Use for detail.

Natural Resource Features

Topography

Topography in Epping is that of coastal plain with the highest elevation of 472 feet found at Kennard Hill in the northwest portion of town and a general sloping towards the east as you approach the coast. This type of topography is common in southeastern New Hampshire, where

the hills are low and their sides generally not steep and the valleys are flat and often wetland. Like the rest of New England, Epping was shaped by the movement of glaciers more than 10,000 years ago. The motion of the glacier moved large amounts of rock and soil materials and smoothed the surface giving a more rounded appearance to the surface. However, the glacier also left us with coarse, stony and often infertile soils.

By combining knowledge of the physical environment with what is known of the distribution of plants and animals, the U.S. Forest Service has divided New Hampshire into the following three principal biophysical or ecological regions or sections:

- Southern New England Coastal Plain and Hills Section (southeastern part of NH);
- Vermont-New Hampshire Upland Section (southwestern part of NH);
- White Mountain Section (Northern part of NH).

Epping is located in the Southern New England Coastal Plain and Hills Section which can be further divided into three subsections:

- Gulf of Maine Coastal Lowland (immediate coastal region);
- Gulf of Maine Coastal Plain (southern portion)
- Sebago-Ossipee Hills and Plain (northern portion).

Epping is in the Gulf of Maine Coastal Lowland, a subsection characterized by broad, hilly plateaus and drumlins leading to the coastal zone. Map 4 highlights Epping's topography.

Soils

Understanding the nature and properties of soils is critical to managing and conserving our natural resources. Through its Soil Survey Program, the Natural Resources Conservation Service (NRCS) studies and inventories soil resources across the country. Soil scientists make this study in order to determine what soils are present, where they are located and how they can be used. Soil surveys contain information in the form of detailed soils maps, data Figures and text narratives that can be used in order to determine appropriate uses for the land. Soil surveys also contain predictions of soil behavior for selected land uses and highlight limitations and hazards inherent in the soil and the impact of selected land uses on the environment. The latter is especially important in Epping because all development relies on on-site wells and septic disposal.

It is important to note that these soil survey maps are designed for general planning purposes and are not at a scale appropriate for site specific use. A site specific soils map should be done by a licensed professional soil scientist wherever there are concerns about the capability of the land for development.

The most recently published edition of the Rockingham County Soil Survey was issued in 1994. This information has been digitized into a GIS (geographic information systems) map by the Rockingham Planning Commission at the end of this report.

- Prime Farmland Soils – These are soils are defined by the US Department of Agriculture has having the best combinations of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops, and are also available for these uses (the land could be cropland, pastureland, forest land, or other land, but not urban built up land or water). Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment. According to aerial photos analyzed by the University of New Hampshire Complex Systems Research Center, there are 1072 acres of prime farmland in Epping.

- Soils of Statewide and Local Importance – This is land, in addition to prime farmland that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Criteria for defining and delineating this land are determined by the NH Department of Agriculture. Generally, these soils are nearly prime farmland that can economically produce high yields of crops when treated and managed according to Figure farming methods. There are 758 acres of soils of statewide importance in Epping and 2699 acres of soils of local importance.

- Wetlands Soils - These soils include Very Poorly (Hydric A) and Poorly Drained (Hydric B) soils. The areas are wet, since water moves through the soil so slowly that the water Figure remains at or near the surface of the ground for the greater part of the year. The reference to “very poorly” and “poorly” refers in part, but not exclusively to, the amount of time water remains at or near the surface. Very poorly drained soils generally occupy level or depressed sites, are frequently ponded, and commonly have soils with a thick dark colored surface layer and gray subsoil. Poorly drained soils occupy nearly-level to sloping sites, are ponded for short periods, have a dark colored surface layer with grayish, mottled subsoil. There are 655.37 acres, 12.7% of very poorly drained soils (Hydric A) soil, and 988.37 acres, 19.2% of poorly drained (Hydric B) soils in Epping. Wetlands are discussed in greater detail in the Water Resources section of the NRI.

- General Soils: The following Figure describes the various soil types found within Epping.

Figure 3 – Epping Soil Types

Soil Type	Acres
CANTON-HOLLIS-CHATFIELD (NH012)	5360.9
CHARLTON-PAXTON-SQUAMSCOTT (NH011)	4400.2
HINCKLEY-WINDSOR-CANTON (NH001)	73.9
HOLLIS-CANTON-CHATFIELD (NH010)	410.4
SCITICO-ELDRIDGE-DEERFIELD (NH002)	4675.0
HINCKLEY-WINDSOR-CANTON (NH001)	1619.1
CANTON-HOLLIS-CHATFIELD (NH012)	236.1

See Map 5 and 8 for soil details.

Recommendations for Protecting Soil Resources:

Soils determine how land should and should not be used. It is important that land use decisions be based on accurate soils information.

- Identify and map prime wetland soils to increase protection of highest functioning wetlands in Epping.

- Identify and map all prime agricultural soils and soils of statewide importance.

Watersheds

A watershed is the geographic area of land that drains surface waters to the lowest point, such as a river or lake. The network of rivers, streams, and other tributaries is collectively known as the drainage system of a watershed.

The Town of Epping lies entirely within the Salmon Falls – Piscataqua River watershed, which is also referered to as the Great Bay watershed. This watershed was identified on the "New Hampshire Hydrologic Unit Map" (source: U.S. Department of Agriculture, Soil Conservation Service, May 1982).

The Epping contains is located entirely within the Lamprey River watershed, a subwatershed of the Great Bay Watershed. See Map 6 for Watershed Details. The Lamprey River begins in Northwood, New Hampshire, and courses 60 miles through six towns before becoming tidal in Newmarket and emptying into the coastal estuary known as Great Bay. The mainstem of the Lamprey River from the Epping/Raymond town line to the tidal portion in Newmarket has been designated a federal Wild and Scenic River. The entire Lamprey River Watershed has been designated under the New Hampshire Rivers Management and Protection Program.

Fresh Water Resources

Epping's fresh water resources consist of a hydrologically connected system of rivers, streams, brooks, ponds, wetlands, and groundwater. The Town's surface and groundwaters are intricately interconnected. In some locations and under some conditions, the surface waters recharge the groundwater and in other locations and conditions, the groundwaters feed our rivers, ponds, wetlands and streams and keep surface waters flowing even during droughts. The quality and quantity of one can significantly affect the other. See Map 6 for Surface Water details.

Buffers, land alongside rivers, streams and ponds, should be left in a naturally vegetated state to protect water quality and wildlife habitat. Vegetation growing along the shore filter pollutants from runoff, promoting groundwater infiltrations, and stabilizing stream banks to control erosion.

Figure 4
Major Waterbodies in the Town of Epping

Lamprey River	**Piscassic River**
North River	**Hoar Pond**
Pawtuckaway River	**Rollins Brook**
Little River	**Muddy Pond**

Figure 5
Riparian Buffer Requirements
as recommended by the Center for Watershed Protection

Function	Minimum Buffer Width
Bank stabilization	50 feet
Sediment control	150 feet
Flood control	200 feet
Wildlife habitat	300 feet

It is important to note that the buffer should be wider if the adjacent land is sloped, if the land use is intensive, if the soils are erodible, if the land is a floodplain and if the stream or river naturally meanders.

The quality of water and habitat in rivers and streams depends upon surrounding land uses and management practices. Sediment from erosion destroys spawning habitat and fills stream beds. Removal of trees and other streamside vegetation raises water temperatures and can destroy habitat for trout and many other species upon which fish depend.

Water quality in the Lamprey River has been monitored annually since 2001 by volunteers in conjunction with the NH Department of Environmental Services Volunteer River Assessment Program (VRAP). Annual reports with monitoring results may be found at the DES website, https://www.des.nh.gov/organization/divisions/water/wmb/vrap/index.htm

There are several surface waterbodies that flow into Epping from abutting communities: Lamprey River, Pawtuckaway River, North River, Piscassic River, and Little River. The mainstem of the Lamprey River enters into Epping from Raymond. Land use along the Lamprey River from its headwaters in Northwood to the Raymond/Epping townline is dominated by forest and wetland until reaching downtown Raymond, which is an urbanized area. The Pawtuckaway River originates in Pawtuckaway State Park and then empties into the Lamprey River; the entire subwatershed is dominated by forest, wetlands and limited residential development. The North River and Little River enter the Lamprey River within Epping boarders. The dominate land use surrounding the North and Little Rivers as they run through Nottingham and Lee is rural residential, wetland and forestland. The Piscassic River, which originates near the Fremont/Epping boarder, does not joint into the Lamprey River until it reaches Newmarket. Within Epping, the Piscassic River is surrounded by wetlands to the south and bordered by commercial development via Route 125 and Route 101.

These various land uses have different impacts on Epping's freshwater resources, with more developed area contributing more pollutants, primarily in the form of stormwater runoff, to the rivers. In Rockingham County, 90% of water pollution is attributable to stormwater runoff (NHDES 2014).

Recommendations for Protecting Freshwater Resources:

- Protect riparian corridors, especially vegetated buffers, to maintain water quality and wildlife habitat.

- Educate the public about non-point pollution from road salt, pesticides, fertilizers, sediment and other pollutants in water runoff.

- Continue participating in the NH DES Volunteer River Assessment Program (VRAP).

- Protect undeveloped areas of river and stream frontage.

- Partner with land conservation organizations such as the Southeast Land Trust and the Lamprey River Advisory Committee in the region to protect critical areas identified in the Land Conservation Plan for New Hampshire's Coastal Watersheds.

- Prevent the spread of invasive exotic aquatic plants such as milfoil, fanwort, water chestnut and purple loosestrife to uninfected lakes and ponds through education and by

monitoring at boat launches. Information on invasive plant species in New Hampshire may be found at the following website:
http://extension.unh.edu/Forestry/Docs/invasive.pdf

Vernal Pools

Vernal pools are common in Epping and all property should be assessed for the presence of vernal pools prior to and development or other land altering activity such as forestry. Although vernal pools may vary in size from a few square feet in area to over a number of acres and may be located in a number of different sites – woods, floodplains or gravel pits—they do have certain features in common. Although they appear in the same place year after year they are defined as a temporary bodies of water because most dry up in hot weather or times of drought. All of them are contained bodies of water without any permanent outflow. They do not support fish and are therefore excellent breeding grounds for species whose eggs would provide an excellent food source were fish present. Some species are so dependent on vernal pools for their survival that their very presence is taken to establish that a particular basin of water is indeed a vernal pool. Not surprisingly, these are known as indicator species.

An essential inhabitant of vernal pools is the fairy shrimp. These are tiny crustaceans that are found throughout the country. They are the earliest creatures to be seen in the spring, often appearing in March when their early mating leaves eggs on the floor of the pool. These are designed to survive drying out, intense heat, freezing, and even being eaten by birds and, despite everything, will hatch the following spring when the pool is once again filled with water. Should there be a dry spell that prevents this from occurring, the eggs are prepared to wait out the weather.

Some amphibians are also indicator species of vernal pools. Indicator species in New Hampshire are the spotted salamander and the wood frog. Wood frogs are one of the earliest creatures to be seen in the spring, often appearing in March, when their early mating makes it possible for the eggs to develop before the pool dries up. The wood frog call sounds very much like the quacking of ducks and is an early sign of spring. This frog is brown with a black mask, and is often seen in the woods during the summer.

Spotted salamanders lay their eggs in vernal pools as well and migrations of salamanders to breeding areas usually take place after the first heavy rain in early spring. Although both the spotted salamander and the wood frog may be found mating in more permanent waters, eggs laid in vernal pools have the best chance of surviving. The spotted salamander will often lay her eggs in October and, if the pool is still dry, will stay with them keeping guard until Fall rains arrive.

Many other species use vernal pools although they do not have the same dependency upon them. Among the amphibians the species are four-toed salamander, Eastern newt, spring peeper, American toad, the gray tree frog, and the green frog. Among the invertebrates, there are clam shrimp, fingernail clams, and amphibious snails, caddis flies and other aquatic insects. Although no reptile is among the indicator species, the spotted turtle, the earliest turtle to appear in the spring, sometimes moving about in March, often uses such pools as a source of food and a place

for courtship and mating. Blanding's turtles have been known to overwinter in vernal pools. Both of these species are endangered in New Hampshire and their appearance is of special interest to the Non-Game and Endangered Species Division of New Hampshire Fish & Game. Information on reporting reptiles and amphibians observed in the wild may be found at the following website: http://www.wildlife.state.nh.us/Wildlife/Nongame/reptiles_amphibians.htm

Recommendations for Protecting Vernal Pools:

Vernal pools provide a unique type of wildlife habitat and are crucial breeding grounds for a number of amphibians. As such, efforts should be made to protect this habitat and the species that it supports. Some methods to accomplish this goal include:

- Identify and map vernal pools on subdivision plans and site plans in order to provide an opportunity to mitigate the impacts to these sensitive areas;
- Education, including a brochure for residents about Epping's land use regulations and conservation policies;
- Keep log landings, roads and trails out of vernal pools and the area adjacent to them. Busy roads near a vernal pool can lead to massive annual mortality and local extinctions;
- Maintain shade around a vernal pool in order to keep it from drying up too quickly and to maintain water temperatures;
- Keep slash out of a vernal pool during forestry operations and during development;
- Maintain the upland (non-wetland) habitat where many vernal pool dependent species spend most of their life cycle.

Groundwater Resources

Epping residents receive their drinking water entirely from groundwater sources. Aquifers are concentrations of groundwater and those having medium to high potential to yield groundwater occur in the seacoast area as alluvial deposits of sand and gravel or in bedrock fractures. The sand and gravel deposits are called "stratified drift aquifers" and typically yield more groundwater than bedrock fractures. The major source of recharge to these aquifers is through precipitation filtering directly down into the aquifer. A 1992 study by the U.S. Geological Survey identified seven small stratified drift aquifers within Epping. See Map 7 for location of groundwater aquifers.

Groundwater quality can be impaired by a variety of materials. Sources of groundwater contamination include landfills, commercial and industrial wastes, agricultural fertilizer, failing

septic systems, and road salt. Groundwater quantity can be reduced by contamination of groundwater supplies, over-pumping in the aquifer zone, and increasing impervious surfaces such as roof tops, roads, and parking lots. These surfaces prevent the infiltration of precipitation into the ground.

Impervious Surfaces - When a watershed is increasingly covered with pavement, buildings, and other compacted surfaces that are impervious to water, significant changes in water quality and quantity result. When rain falls on impervious surfaces, it runs off faster into surface waters, carrying with it sediment and pollutants from road surfaces, lawns, construction sites, and parking lots. Flooding, warming water temperatures, and channelization of streams are the result. Infiltration of rainfall into the ground to replenish groundwater is reduced, reducing the quantity of groundwater available for withdrawals for drinking water.

This type of run-off, called "non-point source pollution", is now the most serious threat to water quality for New Hampshire and for Epping. Low impact construction and site designs that promote retention and infiltration of rainwater and runoff, narrower streets and driveways when possible, shrub and tree buffers to waterways, and more compact development patterns can protect Epping's water quality and quantity as the town grows.

Studies conducted in the northeast have documented that by converting as little as 10% of a watershed to impervious surfaces, stream water quality and organisms begin to deteriorate. Above 25% impervious surface, water quality is seriously degraded.

As of 2010, 10.2% of Epping's land area is impervious. - UNH Complex Systems

See Map 13 for the location of Impervious Surfaces in Epping.

Numerous agencies are currently studying groundwater resources in Southeastern New Hampshire. The New Hampshire Coastal Program, New Hampshire Department of Environmental Services, New Hampshire Geological Survey and the U.S. Geological Survey have researched the availability of groundwater resources in Epping and surrounding communities. Population increase and associated development have resulted in an estimated 50% increase in the use of groundwater and surface water resources for drinking water as well as industrial and other uses. To gain a better understanding of how much groundwater is available in the region, researchers quantified water storage and water movement in groundwater and surface water systems. The final report, "Assessment of Ground-Water Resources in the Seacoast Region of New Hampshire", states:

Climate change in New England is forecast to include more frequent and intense precipitation events, with a slight decrease to little change in total precipitation, and increasing temperatures. The effects of this potential future climate change on the Seacoast hydrologic system would likely

include reduced base flows and fresh ground-water discharges to tidal areas and lowered ground-water levels. The effects of these climate changes by 2025 were estimated to be greater than the potential effects of increased water demands. The analyses indicated that there are potential issues of concern for future use of water resources in the Seacoast region. The models developed and demonstrated in this investigation can provide water-resource managers and planners tools with which to assess future water resources in this region. The findings regarding the effects of increasing water demand and potential climate change on ground-water availability may be transferrable to other regions of the Nation with similar hydrogeologic and climatic characteristics.

The full report is available from the following website:
http://pubs.usgs.gov/sir/2008/5222/

Stormwater - Stormwater is a term used to describe water that originates during precipitation events. It may also be used to apply to water that originates with snowmelt or rain. Stormwater that does not soak into the ground becomes surface runoff, which either flows into surface waterways or is channeled into storm sewers. The US EPA established the National Pollutant Discharge Elimination System (NPDES) to identify sources of stormwater pollution and other contaminating discharges.

Stormwater is of concern for two reasons, flooding and pollution. The volume and timing of runoff can impact flood storage and control, and stormwater runoff can also flush potential contaminants from roads and parking lots into surface waters.

The treatment and management of stormwater becomes increasingly important with the increasing amounts of impervious surface cover in Epping and surrounding communities. Two important resources exist for aiding in stormwater management: the US EPA, and the University of New Hampshire Stormwater Center, which serves as a local resource to communities on stormwater management. The UNH Stormwater Center's website has many resources for Planning Boards, Conservation Commissions, developers and landowners: http://www.unh.edu/unhsc/

Recommendations for Protecting Groundwater Resources:

- Require that stormwater and meltwater be retained on site when land is developed.

- Raise public awareness on reducing non-point source pollution from pet waste, fertilizers, pesticides, gasoline, automotive oil, antifreeze, and other hazardous wastes. The public should also understand the importance of aquifer recharge.

- Modify the Epping Zoning Ordinance to prohibit or restrict new potential contamination sources from locating in a wellhead protection area.

- Continue to hold but more widely advertise an annual household hazardous waste collection program for residents; add options for convenient disposal at Transfer Station for used oil and mercury products.

- Continue land conservation and protection efforts along rivers and streams, including reviewing land use ordinances, monitoring of storm drain markers, maintenance of signs, updating of stormwater sewer maps, and continue screening outfalls for illicit discharges.

Wetlands

Wetlands, as defined by the Environmental Protection Agency, the NH Department of Environmental Services are those areas that are inundated or saturated by surface or groundwaters at a frequency and duration sufficient to support and that under normal circumstances do support a prevalence of vegetation adapted for life in saturated soil conditions. Thus a wetland is defined by the presence of all three "H's": hydrophytes or wetland vegetation, hydrology and hydric soils.

Wetlands are an integral part of Epping's natural resources. They are important for removing excess nutrients and sediment from the water, slowing and storing floodwaters, promoting groundwater infiltration, and providing habitat for a variety of vegetation and animal life. In addition, wetlands provide recreational, educational and research opportunities. They add to the visual resources of the Town, especially in the fall when the red maples turn scarlet. Wetlands are most often found along streams and adjacent to ponds and lakes. They can be found in clustered complexes that are of great value. Vernal pools are a special type of wetland that dry out completely in the summer and have no fish population.

There is a diversity of wetland types in Epping, including areas of open water with emergent vegetation such as cattails, forested wetlands, and scrub-shrub wetlands. The principal types of wetlands with standing water in the spring have been mapped from aerial photos by the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service. The NWI wetlands do not include all wetlands, particularly those that do not typically have standing water in the spring. Therefore, this is an underestimate of the amount of wetlands. The more significant, wetlands, however, are included in the NWI.

The NWI classification codes for Epping describe the dominant vegetation type as well as the hydrology of each wetland. For the purposes of this map, these codes were categorized by the dominant vegetation type.

- **Emergent wetlands** are those wetlands with non-woody vegetation that grows above the land and/or water surface. Cattail marshes are one example of emergent wetlands.

- **Forested – deciduous wetlands** are wetlands with deciduous trees as the dominant vegetation type. Red maple swamps are one example of forested – deciduous wetlands.
- **Forested – evergreen wetlands** are wetlands with evergreen trees as the dominant vegetation type. Hemlock, balsam fir and white cedar are examples of evergreen trees that might be dominant in a forested – evergreen wetland.
- **Forested – dead wetlands** are wetlands where a once forested wetland has been flooded (usually by a beaver impoundment) and the standing trees are dead. These wetland types often become nesting areas for great blue herons until the trees fall down and the impounded water becomes densely vegetated.
- **Deciduous – shrub wetlands** are wetlands where the dominant form of vegetation is deciduous shrubs. Highbush blueberry, silky dogwood, sweet gale and winterberry are common deciduous shrubs in Epping wetlands.
- **Evergreen – shrub wetlands** are relatively uncommon. These wetland types are dominated by shrubs that do not lose their leaves. Leatherleaf and labrador tea are broadleaf evergreen shrubs. Other evergreen shrubs might be balsam fir, black spruce and other evergreen trees that have not yet reached tree size.
- **Unconsolidated bottom wetlands** are those wetlands with open water over most of the surface area of the wetland. Vegetation may grow in these wetlands below the surface of the water and/or may float on the water but is typically not visible early in the growing season when the aerial photography used to classify wetland types is taken.

The areas and number of each wetland type in Epping are shown below in Figure 5. The wetlands count does not reflect separate wetlands, but patches of wetlands classified as a particular type. The total area for NWI wetlands in Epping is 2,150 acres or 24.6 % of the town's surface area.

Figure 5
National Wetland Inventory of Wetlands in Epping

Wetland Type	Acres
Freshwater Emergent Wetland	229.5
Freshwater Forested/Shrub Wetland	1671.2
Freshwater Pond	159.3
Lake	73.9
Riverine	16.3
Total	2150.2

Wetland Buffers - In addition to retaining the wetland itself, the undeveloped uplands surrounding the wetland are also essential for a healthy wetland. Maintaining a buffer of a naturally vegetated upland area adjacent to wetlands and surface waters is important to reduce

the adverse effects of human activity on these water resources. Vegetation in buffers intercepts rainfall, slows meltwater and promotes infiltration. In addition, a vegetated buffer provides habitat for species dependent on the wetland system and travel corridors for larger mammals. A minimum upland buffer width around wetlands and other shorelines of 100 feet is recommended and 300 feet is desirable to maintain good habitat.

The first step to protecting wetlands and the functions they provide is protecting the land surrounding them. A look at current zoning regulations in Epping shows a limited amount of protection to buffers compared to recommendations from "Buffers for Wetlands and Surface Waters", A Guidebook for New Hampshire Municipalities published in 1997 by the NH Department of Environmental Services. The guidebook states that "100 feet is recommended as a reasonable minimum buffer width under most circumstances." It explains that research has shown that 100 feet will generally provide a 60% or higher removal rate of pollutants. Because of the impacts to human health of tainted water supplies, buffers larger than 100 feet may be prescribed around existing or potential water supplies. Buffers of 100 feet protect wildlife species that are aquatic or that stay very close to the wetland edge, but would provide little or no life support for others. Water quality in wetlands and surface waters is important for all wildlife, not just aquatic.

Current Epping zoning regulations currently have a building setback of between 15 and 50 feet from wetlands and 75 feet from the major rivers. Septic systems, which generate excess nutrients and pathogens, are not at the minimum recommended setback and are potentially very detrimental to wetland systems. Septic systems have a finite useful life until replacement is needed; unfortunately replacement is seldom done until the system fails. Hydric B wetlands are usually a waterbody's first defense against pollutants and need just as much buffer as Hydric A soils to provide an acceptable rate (60%) of pollutant removal. Buffering wetlands and surface waters should make up only one piece of a comprehensive natural resource protection plan. As this town faces more development pressures on natural resources, changes in zoning may need to be instituted, coupled with protection through acquisition or easements, to protect a broad spectrum of water resources.

The State of New Hampshire's Shoreland Protection Act CSPA protects surface water resources by regulating buildings, docks, and septic systems along the shoreland, including Great Bay. All primary structures must be set back at least 50 feet from the high water or high tide mark. Natural vegetation must also be maintained along the shoreline. In Epping, the Lamprey River, Piscassic River and North River are all regulated under the Shoreland Protection Act. For more information on the Comprehensive Shoreland Protection Act, visit the NH DES website, www.des.nh.gov/organization/divisions/water/wetlands/cspa/index.htm

Recommendations for Protecting Wetland Resources:

- Educate the public as to what they can do to protect wetlands and vegetative buffers around wetlands. This should include the importance of reducing non-

point source pollution from sedimentation, fertilizers, pesticides, and hazardous wastes.

- Continue to work with the Wetlands Bureau of NHDES to enforce State laws and rules.

- Increase the setback for septic systems to 100' from wetland soils - Hydric A and Hydric B.

Potential Threats to Water Resources

There are two general types of pollution threats to surface and groundwater resources: nonpoint and point. Nonpoint pollution sources are diffuse and may discharge pollutants over a broad area. Examples include stormwater runoff from parking lots and roads, erosion and sediment from land development, and leachate from failed septic systems. Point sources of pollution are discernible as the sources can be identified, typically pipes, ditches, and channels.

Potential threats to water resources in Epping include:

- Salt Piles – There is one Town-owned salt pile, located at the Epping Transferstation on Coffin Road.

- Salted Road – All the paved roads in Epping receive some degree of salting during the winter months.

- Underground Fuel Storage Tanks – fire department, Underground Storage Tanks (UST) are a potential threat to water resources in that releases can occur due to spills, defects in tank construction, improper installation, and corrosion of older tanks. New Hampshire requires all tanks with a capacity of 1,100 gallons or more to be registered and the use reported to the NH DES Waste Management Division.

- Pesticide Application Sites, Farms, and Agricultural Uses – There are several active farms in Epping which may use fertilizers and pesticides as a part of normal agricultural practice. The New Hampshire Department of Agriculture, Markets, and Food promotes the use of Best Management Practices to reduce the threat of pollution from agricultural operations.

- Industrial and Manufacturing Activity – There are several industrial and manufacturing businesses in Epping located along the Route 125, Route 27 and Main Street. C

- Septic Systems and Leaching Fields – Generally speaking, septic systems are considered nonpoint source pollution because of their discharge of effluent into the ground. The

threat presented by such systems increases when a system fails and the wastewater is not treated sufficiently. All areas of Epping not serviced by the municipal sewer system are treated by septic systems.

Agricultural and Farmland Resources

Agricultural land is valued in Epping for the food that its farmers produce, some of which is locally available. It is also valued for its scenic beauty and diverse habitat. Epping's farmers and farm families help other residents connect with the town's rural heritage and promote better land management. In addition, Epping's farmers are stewards of significant natural resources in the community. Figure 6 describes some active farms in Epping (NH Deparment of Agriculture, Markets and Food). See Map 8 for Agricultural Soils detail.

Aside from its obvious importance for growing food, agricultural land has value as a scenic resource, as wildlife habitat, and as a groundwater recharge area. Farming also provides economic benefits, especially to the local and regional economy. The loss of farmland has a direct impact on the landscape as well as an indirect impact on the local tax rate. The indirect economic benefit of farming relates to the real estate value of the farmland itself compared to the cost of providing public services to residents once the land is converted to residences. As demonstrated in the *Cost of Community Services* study conducted by the UNH Cooperative Extension Service in 1995, residential subdivisions cost the town more in terms of providing municipal services than is received in increased property tax revenue, whereas farmland and other open land produce more in revenues than they consume in services, even when enrolled in the Current Use program.

Although most of the farms are smaller in size than in the past, these remaining farms have a very significant impact on the scenic and rural qualities of the community. Farming in Epping is defined as any agricultural activity in which land is used for the purpose of producing any cultivated commodity, livestock or poultry.

Figure 7
Epping Farms

Riverslea Farm	**Pelosi Family Farm**
Inkwell Farm	**Prescott Orchards**
Clark Farm	**White Gate Farm**

Agricultural Soils - New Hampshire is losing its most productive farmland. Between 1982 and 2000, nearly 18,000 acres of prime farmland became unavailable for production of crops, feed, forage or fiber. Most was lost to urban and rural development. Only 2% of New Hampshire soils classify as prime farmland. Prime Farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and is also available for these uses. Cropland, usually the most productive agricultural land, has declined 30% statewide from 1974 to 2000.

An analysis of 2010 landcover data shows that 1072 acres of land in Epping are classified as Prime Farmland, 2699 acres are classified as farmland of local importance, and 759acres are classified as farmland of statewide importance. The last two categories are defined as soils that may economically produce high yields of crops when treated and managed according to acceptable farming methods.

Hay is grown on a commercial basis by several farms, as listed in Figure 6. There are other Epping residents who hay or have their fields hayed but are not commercial operations. There are numerous other residents unknown to us who have horses, sheep, chickens and other livestock. In addition, many people raise vegetables , fruit and herbs for their own consumption and to share with their neighbors.

In order to get a more accurate understanding of the value of agriculture to Epping, the Town could complete an Agricultural Profile. A copy of the fact sheet *Developing an Agricultural Profile for Your Town* is available from the UNH Cooperative Extension:
http://extension.unh.edu/resources/representation/Resource000023_Rep23.pdf

Recommendations for Protecting Agricultural Resources:

Agriculture is important to Epping in many ways. The commercial farms contribute to the town economically and the Town's residents are fortunate to enjoy locally grown produce. The open fields and farm structures comprise the rural and scenic character of town.

Recommendations to help sustain economically viable agriculture in Epping are:

- Educate the public that once important farmland soils are developed they are usually lost forever.
- Consider forming an Agricultural Commission.
- Support Eat Local campaigns and encourage residents to buy locally grown food.
- Protect the Important Farmland soils that are necessary for economically viable agricultural activities by working with landowners and land conservation organizations on conservation easements.
- Identify and map prime farmland soils and soils of statewide importance.
- Reduce conflict between agricultural and residential uses by requiring a buffer when land is developed adjacent to a farm.

- Continue to educate farmland owners about the benefits of conservation easements on their property.

- Encourage farmers to follow "Best Management Practices" to protect water quality.

Forest Resources

Forests provide Epping with a diverse range of benefits. Epping's forests provide valuable habitat for plant and animal populations. The forests absorb rainwater, increase groundwater infiltration, and buffer surface waters from sedimentation and contamination. Near roads and homes, trees cool summer temperatures by 10 degrees or more, break winter winds, and filter dust and pollutants from the air. Forests host scenic recreational trails and hunting grounds. Our tourist industry and seasonal residents are attracted by healthy forests. In addition, well-managed forests provide a sustainable supply of maple syrup, home firewood and commercial wood products and jobs needed by New Hampshire residents.

Forest Cover - A forest is comprised of several forest types. Forest types are distinctive associations or communities of trees, shrubs, and herbaceous plants. They are named for the predominant tree species occurring in the type. Common forest types in Epping include White Pine; Northern Hardwood (sugar maple, beech, yellow birch, red maple, white ash and smaller amounts of other species); Spruce-Fir, Red Oak, Hemlock, and Aspen-Birch. A forest type may be dominated by a single tree species or it may dominated by several species growing together.

Epping's forests provide us with wood and food products, wildlife, scenic beauty, a modified microclimate, stabilization of steep slopes and snowpacks, the control of water flows, the creation and maintenance of stream habitat for aquatic animals, and recreation. In addition, forests constitute a major storage of carbon not only in the trees themselves, but in the forest soils as well.

New Hampshire is the second most forested state in the US trailing Maine. Epping is approximately 56% forested as of 2015; the state average is approximately 85%. Many of Epping's forests have grown from abandoned agricultural land and are now mature.

Recommendations for Protecting Forest Resources:

- Identify forestland abutting rivers and streams for conservation as these forests play an important role in protecting water quality and quantity, and wildlife habitat: http://extension.unh.edu/resources/files/Resource000428_Rep450.pdf

- Encourage planting/transplanting native species.

- Adopt tree clearing regulations to minimize soil erosion, preserve wildlife habitat, and protect water resources.

- Partner with land conservation organizations and surrounding municipalities in the region to protect critical areas identified in the Land Conservation Plan for New Hampshire's Coastal Watersheds.

- Promote sustainable forestry and cooperation among adjacent forest landowners.

- Consider forming a Forestry Commission.

Natural Communities

The July 2010 report from the NH Natural Heritage Bureau entitled, *Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns*, describes natural communities as different types of forests, wetlands, and grasslands. Most of New Hampshire is covered by relatively common natural community types. Scattered throughout the state, however, and usually in predictable areas, are distinctive communities found in few other places. The Natural Heritage Bureau tracks exemplary natural communities. To qualify as exemplary, a natural community must be of a rare type or must be a very old occurrence of common community in good condition. See Map 9 for Natural Heritage Bureau details

Epping's natural communities serve not only a practical and essential role in keeping our soil, water and air healthy, a concept known as ecological services, but they provide us with diverse physical landscapes and scenic beauty.

Natural communities are defined by three characteristics:

- The plant species present;
- The physical structure of the vegetation (short grasses vs. tall trees);
- The physical environment, which consists of the physical setting (pond shore or hillside), the water and nutrients present and the climate.

Natural communities are made up of living components that are closely interrelated and interact with one another and the environment. Humans are also a part of the living landscape and have a tremendous influence. Human disturbance of the natural environment is occurring at a faster pace than the natural communities can adapt to. It is vital we become aware of the natural communities we have in Epping in order to protect them.

Figure 8
Rare Natural Communities, Plant Species, and Animal Species in Epping
Source: NH Natural Heritage Bureau, July 2013

NH Natural Heritage Bureau

Town Flag	Species or Community Name	Listed? Federal	Listed? State	# reported last 20 yrs Town	# reported last 20 yrs State
Epping					
	Natural Communities - Palustrine				
**	Alder - dogwood - arrowwood alluvial thicket	--	--	1	2
**	Low-gradient silty-sandy riverbank system	--	--	1	4
**	Red maple floodplain forest	--	--	1	15
	Plants				
	Engelmann's Quillwort (*Isoetes engelmannii*)	--	E	Historical	15
**	Georgia Bulrush (*Scirpus georgianus*)	--	E	1	3
	hollow Joe-Pye weed (*Eutrochium fistulosum*)	--	E	Historical	10
**	long-leaved pondweed (*Potamogeton nodosus*)	--	T	1	24
	slender blue iris (*Iris prismatica*)	--	E	Historical	11
**	Small Whorled Pogonia (*Isotria medeoloides*)	T	T	1	51
**	weak stellate sedge (*Carex seorsa*)	--	E	1	3
	Vertebrates - Reptiles				
***	Blanding's Turtle (*Emydoidea blandingii*)	--	E	14	709
	Northern Black Racer (*Coluber constrictor constrictor*)	--	T	Historical	54
**	Spotted Turtle (*Clemmys guttata*)	--	T	2	119
***	Wood Turtle (*Glyptemys insculpta*)	--	SC	5	193
	Vertebrates - Fish				
**	American Eel (*Anguilla rostrata*)	--	SC	4	177
***	Bridle Shiner (*Notropis bifrenatus*)	--	T	1	22
	Invertebrates - Dragonflies & Damselflies				
**	Sparkling Jewelwing (*Calopteryx dimidiata*)	--	--	1	9
	Invertebrates - Mollusks				
***	Brook Floater (*Alasmidonta varicosa*)	--	E	1	32

Listed? E = Endangered T = Threatened SC = Special concern

Flags
**** = Highest importance
*** = Extremely high importance
** = Very high importance
* = High importance

These flags are based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town. Please contact the Natural Heritage Bureau at (603) 271-2214 to learn more about approaches to setting priorities.

Protecting our natural communities is necessary to preserve the biological diversity of our community and of New Hampshire. Biological Diversity, or **biodiversity**, is the variety and variability of all living organisms. This variety includes the diversity of plants, animals, fungi, algae, bacteria, and other microorganisms, their genetic variability, the natural communities in which they live, and the processes and interactions that weave the biological and physical elements of the planet into a complex web.

Plant Communities

Endangered/Threatened Species

In 1987, the New Hampshire state legislature passed the Native Plant Protection Act (NH RSA 217-A) and formally recognized that "for human needs and enjoyment, the interests of science, and the economy of the state, native plants throughout this state should be protected and

conserved; and their numbers should be maintained and enhanced to insure their perpetuation as viable components of their ecosystems for the benefit of the people of New Hampshire." Currently, there are 288 species listed as endangered or threatened under the Native Plant Protection Act and that are tracked by the NH Natural Heritage Bureau.

The Epping Conservation Commission encourages input from residents should they find an unusual plant species or a unique natural community. The Commission may be reached by calling the Town Office at 603-394-7696.

Endangered and threatened are defined under the NH Native Plant Protection Act as: **Endangered species** are those ceasing to exist locally or in the state; **Threatened species** face the possibility of becoming "endangered".

Plants Listed as Special Concern - In addition to recognizing Endangered and Threatened plant species, the NH Native Plant Protection Act identifies 11 plants as Special Concern. These species are somewhat uncommon in New Hampshire, and are at risk of decline due to over-collection.

The NH Natural Heritage Bureau does not track these species:

- Narrow-leaf wild leek — *Allium tricoccum* var. *burdickii*
- Wild leek — *Allium tricoccum* var. *tricoccum*
- Wild ginger — *Asarum canadense*
- Giant blue cohosh — *Caulophyllum giganteum*
- Blue cohosh — *Caulophyllum thalictroides*
- Sea lavender — *Limonium carolinianum*
- Ostrich fern — *Matteuccia struthiopteris* var. *pensylvanica*
- Canadian burnet — *Sanguisorba Canadensis*
- Slippery elm — *Ulmus rubra*

These species are not rare in New Hampshire, but their showy nature makes them vulnerable to over-collection. Although the listing does not give the plants any legal protection, it does give the landowner recourse if someone digs it up without the landowner's permission.

Invasive Species - It is important that those of us who reside in Epping be informed and aware of invasive species (plants, insects and fungal species) that have the potential to destroy and displace those natural resources that are vital to our biodiversity. According to the New England Wildflower Society, nearly 1/5th of New England's 3,000 plant species are in danger of disappearing from our region. The Nature Conservancy estimates that 42% of all species on the Federal Endangered Species Lists are listed partly due to the effects of invasive species (and for 18%, invasive species are the sole reason for their listing). According to the US Department of Agriculture website, http://www.invasivespeciesinfo.gov/, over $100 million dollars a year is spent in the United States combating invasive plants in wetlands alone. Rich, diverse plant communities can become barren, inhospiFigure expanses of invasive plants with little value to

wildlife. Invasive plants may even deplete groundwater. The public must be educated to buy plants wisely and to control existing invasive plants. Common invasive species observed in Epping include Autumn Olive, Oriental Bittersweet, Japanese Knotweed, and Japanese Honeysuckle.

What is an Invasive Species? An invasive Species is a plant, insect, and/or fungal species that is not naturally native to a particular region and has the ability to thrive and spread aggressively outside its natural range. The Invasive Species thrives and spreads in a new habitat due to the fact it has no natural predators (insects, diseases and/or foraging animals) that naturally keep its growth under control as they would in their own native habitat. Invasive plant species commonly found in Epping include Phragmites, Purple Loosestrife, Glossy Buckthorn, Barberry, Burning Bush, Multiflora Rose, and Japanese Knotweed. All these plant species are common landscape plants that migrate into open and undeveloped areas.

Why and Where are Invasive Species a problem? Without any natural predators to prevent its spread, the invasive species, particularly in the case of plants, will put extreme pressure on native plants and animals. Ultimately the invasive plant will alter native habitats and reduce biodiversity by choking out native vegetation, threatening rare and endangered species and degrading wildlife habitat. With the loss of native vegetation and wildlife habitat also comes the loss of a number of our native animal, bird and insect species that depend on the native habitats to survive. Invasive species present the worst threat in wetlands, sand dunes, fire prone areas, and serpentine barrens where rare native plants are found. Invasive plants:

- Produce large numbers of new plants each season;
- Tolerate many soil types and weather conditions;
- Spread easily and efficiently, usually by wind, water, or animals;
- Grow rapidly, allowing them to displace slower growing plants;
- Spread rampantly when they are free of the natural checks and balances found in their native range.

In 2000, the State of New Hampshire enacted legislation under House Bill 1258-FN which "requires the Commissioner of Agriculture, Markets, and Food to conduct research and educational activities which address the effects of invasive plant, insect and fungal species upon the state". As a result of this legislation, the New Hampshire Invasive Species Committee was formed

Figure 9
Prohibited Plant Species in New Hampshire

Tree of Heaven *(Ailanthus altissima)*	Fanwort *(Cabomba caroliniana)*
Garlic Mustard *(Alliaria petiolata)*	Oriental Bittersweet *(Celastrus orbiculatus)*
European Barberry *(Berberis vulgaris)*	Black Swallow-wort (*Cynanchum nigrum)*
Flowering Bush (*Butomous umbellate)*	Purple Loosestrife *(Lythrum salicaria)*
Pale Swallow-wort (*Cynanchum rossicum)*	Parrot Feather *(Myriophyllum aquaticum)*
Brazilian elodea *(Egeria densa)*	Variable Milfoil *(Myriophyllum heterophyllum)*
Autumn Olive *(Elaeagnus umbellate)*	Europ. Water-Milfoil *(Myripphyllum spicatum)*
Giant Hogweed *(Heracleum mantegazzianum)*	European Naiad *(Najas minor)*
Hydrilla *(Hydrilla verticillata)*	Yellow Floating Heart (*Nymphoides peltata*)
European Frogbit *(Hydrocharis morus-ranae)*	Common Reed *(Phragmites australis)*
Water-flag (*Iris psuedacorus)*	Japanese Knotweed *(Polygonum cuspidatum)*
Blunt-leaved Privet *(Ligustrum obtusifolium)*	Curly-leaf Pondweed *(Potomogeton crispus)*
Showy Bush Honeysuckle *(Lonicera x bella)*	Common Buckthorn *(Rhamnus cathartica)*
Japanese Honeysuckle (*Lonicera japonica)*	Glossy Buckthorn *(Rhamnus frangula)*
Morrow's Honeysuckle (*Lonicera morrowii)*	Multiflora Rose *(Rosa multiflora)*
Tartarian Honeysuckle (*Lonicera tatarica)*	Water Chestnut *(Trapa nutans)*
Burning Bush (*Euonymus alatus)*	Japanese Barberry *(Berberis thunbergii)*
Norway Maple *(Acer platanoides)*	

More information on prohibited plant species may be found at the following website: http://www.nh.gov/agric/divisions/plant_industry/

Figure 10
Prohibited Insect Species in New Hampshire

Honeybee Tracheal Mite (*Acarapis woodi)*	Asian Longhorned Beetle *(Anoplophora glabripennis)*
Hemlock Woolly Adelgid *(Adelges tsugae)*	Cedar Longhorned Beetle (Callidellum rufipenne)
City Longhorned Beetle *(Aeolesthes sarta)*	Japanese Beetle (*Popillia japonica)*
Siberian Silk Moth *(Dendrolimus sibircus)*	Viburnum Leef Beetle *(Pyrrhalta viburni)*
Elongated Hemlock Scale (*Fiorinia externa)*	European Chafer (*Rhizotrogus majalis)*
Redhaired Bark Beetle *(Hylurgus lingniperda)*	Nun Moth *(Symantria monacha)*
European Spruce Bark Beetle *(Ips typographus)*	Brown Spruce Longhorn Beetle (*Tetropium fuscum)*
Asian Gypsy Moth *(Lymantria dispar)*	Varroa Mite *(Varroa destructor)*

Beneficial Insects

Beneficial insects are a natural way to fight insect pests and protect our environment. When we encourage beneficial insects we are increasing our biodiversity and decreasing our dependency on poisonous chemical controls. Not only are we creating a more beautiful environment, but a safer one as well.

There are two categories of insects considered beneficial, predators and parasites. Predators are organisms that kill and feed on their prey outright. They are generally larger than their prey and must eat lots of prey to complete their development. Parasites are usually smaller and often weaker than their prey. They lay eggs on or within a host insect. The immature larvae use the host for food over time. A parasite will use only one or a few insects for food.

You can entice beneficial insects to your yard and garden by providing them with the three basic necessities: water, food and shelter. In addition, you should avoid using and/or spraying broad-spectrum insecticides. The broad-spectrum insecticides are not selective in that they will kill not only the pest but the beneficial as well. Even the organic pesticides will kill the beneficial insects.

Figure 11
Beneficial Insects

Beneficial Insects	Pests They Prey On
Aphid Midge	60 species of aphids (on vegeFigures, flowers, fruit and shade trees)
Assasin Bug	Many insects including, aphids, Japanese beetles, leaf hoppers, fly larvae, tomato hornworms
Big-eyed Bug	Eggs and small larvae of armyworms, hornworms, loopers, corn earworms, spider mites, aphids, leafhoppers, flea beetles, mealybugs and thrips. One big-eyed bug can eat 12 small caterpillars or leafhoppers per day.
Braconid Wasp	Tomato hornworm, armyworm, cabbageworm, gypsy moth, other caterpillars, beetle larvae, flies, aphids and other insects
Bumblebees, including the Orchard Mason Bee	Extremely important wild pollinators for a variety of fruit and seed crops.
Centipedes	Predators of soil-dwelling pests and insects including slugs, worms and fly pupae. They may also feed on earthworms, but are considered beneficials.
Damsel bugs	Aphids, thrips, leafhoppers, caterpillars, plant bugs and tree hoppers
Damselflies, Darners & Dragonflies	Mosquitoes and small flying insects
Firefly	Many species of pest insects
Ground Beetle	Most species prey on slugs, snails, cutworms and cabbage-root maggots in soil; some pursue prey on plants or trees, such as Colorado potato beetle larvae, gypsy moth and tent caterpillars.

Hoverflies (Flower flies)	Many species of aphids
Honeybee	Extremely important pollinators of fruit, vegeFigures and agricultural crops. It is estimated that over 80 percent of pollination is done by domestic honeybees. [1]
Ichneumon Wasp	They lay their eggs inside other host insects such as caterpillars, sawfly, beetle larvae and other pests then parasitizes and kills the host.
Lacewing	Soft-bodied insects including aphids, thrips, mealybugs, some scales, moth eggs, small caterpillars and mites.
Lady Beetle (Ladybugs)	Aphids, thrips, mealybugs, mites or soft scales.
Mealybug Destroyer	Mealybugs, scale insects, aphids.
Millipedes	Feed on decaying plant material and are beneficial in breaking down organic matter. May occasionally feed on plant material laying on ground, like strawberries and tomatoes. Also predator of slugs and fly pupae.
Minute Pirate Bug	Will eat anything, but prefer thrips, spider mites, eggs of many insects, small caterpillars, leafhopper nymphs, corn earworms.
Praying Mantis	Almost anything, including other beneficial insects.
Predatory Mite	Spider mites
Predatory Thrip	Eggs and larvae of spider mites, aphids, other thrips, codling moth, Oriental fruit moth, bud moth, peach twig borer, alfalfa weevil, whitefly, leafminer flies and scales.
Rove Beetle	Many are predators of aphids, springtails, nematodes, fly eggs and maggots in the soil; some are parasitic on cabbage-root maggots and larvae of other flies. Many species are scavengers on decaying material.
Spiders	All spiders are predators. Wolf spiders are particularly beneficial to farmers and gardeners because they attack many common garden pests.
Spider Mite Destroyer	Many species of spider mites, especially in unsprayed raspberry patches.
Spined Soldier Bug	Many species of hairless caterpillars and beetle larvae including fall armyworm, sawfly larvae, Colorado potato beetle and Mexican bean beetle larvae.
Tachinid flies	Many species of caterpillars, including cutworms, armyworms, tent caterpillars, cabbage looper, gypsy moth; some attack sawflies, Japanese beetle, May beetle, squash bugs, green stink bugs and sowbugs.
Tiger beetles	Both adults and larvae prey on a wide variety of insects, but are considered mostly beneficial.
Trichogramma Wasps	Eggs of over 200 species of moths, including spruce budworm, tomato hornworm, corn earworm, corn borers and codling moth.
Water Boatmen	Mosquito larvae underwater
Water Strider	Mosquitoes at water's surface
Yellow Jackets	Adults seize large numbers of caterpillars, flies, beetle grubs and other insects to feed their young.

[1] *Rodale's Successful Organic Gardening – Controlling Pests and Diseases,* 1994

Wildlife Habitat

Epping's forests, grasslands, farmland, and rivers provide rich and diverse habitat for numerous animal species. An on the ground inventory of animals for Epping has never been conducted, so the true extent of special habitats, rare species and common species is unknown. However, the 2015 New Hampshire Fish and Game Wildlife Action Plan provides a snapshot of Epping's wildlife habitat. These special habitats and unfragmented natural lands need to be conserved in order to prevent common species from becoming rare and rare species from being extirpated from New Hampshire. See Map 2 for Wildlife Action Plan detail.

The New Hampshire Fish and Game Wildlife Action Plan may be found at the following website: http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm

Unfragmented Open Space - Large blocks of forest, wetlands and farmland that are unfragmented by development or public roads are valuable for many reasons, since they:

- provide essential forest interior habitat for species such as some songbirds that need to be distanced from human activity, pets, and the forest edge in order to survive.
- provide habitat for mammals that have large home ranges and prefer to avoid human contact, such as bobcat, otter, and moose.
- enable owners of large parcels of forestland to conduct timber harvests that are economically viable.
- minimize conflicts that can arise when managed forests and farms are surrounded and interspersed with development.
- offer opportunities for remote recreation, including hunting, hiking, birdwatching, horseback riding, cross country skiing, fishing, and snowmobiling, where landowners allow.

Larger fragments are more likely to support viable populations of species and therefore act as a source of individuals that can then move to another fragment. Small fragments may be unable to support breeding populations. Persistent fragmentation may also lead to genetic changes and a loss of genetic diversity as populations are subdivided into small locally breeding populations.

Figure 11 lists the types of habitat found in Epping as determined by the NH Fish and Game as part of the 2006 Wildlife Action Plan (WAP).

Figure 12
Wildlife Habitat Acres
Source: NH Fish and Game Wildlife Action Plan, 2015

Habitat Type	Acres
Appalachian Oak-Pine	7064
Hemlock-Hardwood Pine	2801
Grasslands	1700
Floodplain Forest	524
Temperate Swamp	977
Peatland	282
Marsh and shrub wetland	769

Conserving these large blocks and connections between other significant habitat areas is important if residents want to retain the species that need larger and diverse home ranges and territories. Some areas should be studied further because the extent of unfragmented lands extends significantly into an adjacent Town making that block more important. Habitat block size requirements for various animals are currently a subject of much study.

Grasslands - Grasslands are an ever diminishing and crucial requirement for many birds, including meadowlarks, bobolinks, woodcock, and killdeer which are under increasing pressure from loss of habitat. The 2017 NH Fish and Game Wildlife Action Plan estimates there are 1700 acres of grasslands in Epping, with a small percentage only of these lands protected from development through conservation easements.

Figure 13
Bird Species Observed in Epping

American Black Duck	Downy Woodpecker	Pileated Woodpecker
American Crow	Eastern Bluebird	Pine Grosbeak
American Goldfinch	Eastern Screech-Owl (red morph)	Pine Siskin
American Robin	Eastern Wood-Pewee	Purple Finch
American Kestrel	European Starling	Red-breasted Merganser
American Tree Sparrow	Evening Grosbeak	Red-breasted Nuthatch
Bald Eagle	Fox Sparrow	Red-eyed Vireo
Baltimore Oriole	Gold-crowned Kinglet	Red-shouldered Hawk
Barn Swallow	Gray Catbird	Red-tailed Hawk
Barred Owl	Great Black-backed Gull	Red-winged Blackbird
Belted Kingfisher	Great Blue Heron	Ring-billed Gull
Black-and-white Warbler	Great Horned Owl	Rose-breasted Grosbeak
Black-capped Chickadee	Great-crested Flycatcher	Ruby-throated Hummingbird

Black-throated Green Warbler	Greater Yellowlegs	Rufous-sided Towhee
Blackburnian Warbler	Hairy Woodpecker	Scarlet Tanager
Blackpoll Warbler	Hermit Thrush	Sharp-shinned Hawk
Blue Jay	Herring Gull	Song Sparrow
Bobolink	Hooded Merganser	Tree Swallow
Broad-winged Hawk	Eastern Kingbird	Tufted Titmouse
Brown Creeper	Eastern Phoebe	Turkey Vulture
Brown Thrasher	House Finch	Veery
Brown-headed Cowbird	House Sparrow	Purple Martin
Bufflehead	House Wren	Red-bellied Woodpecker
Canada Goose	Indigo Bunting	White-breasted Nuthatch
Canada Warbler	Least Flycatcher	White-crowned Sparrow
Cedar Waxwing	Killdeer	White-throated Sparrow
Chestnut-sided Warbler	Lesser Yellowlegs	Wild Turkey
Chipping Sparrow	Loon	Wood Thrush
Common Flicker	Mallard Duck	Wood Duck
Common Goldeneye	Mourning Dove	Yellow-bellied Sapsucker
Common Grackle	Mute Swan	Yellow Warbler
Common Merganser	Northern Cardinal	Woodcock
Common Raven	Northern Harrier	
Common Redpoll	Northern Flicker (yellow-shafted)	
Common Yellowthroat	Northern Mockingbird	
Cooper's Hawk	Osprey	
Dark-eyed Junco (slate-colored)	Olive-sided Flycatcher	
Double-crested Cormorant	Pheasant	

Mammal Species Observed in Epping

American Beaver	Eastern Cottontail	Red Squirrel
Big Brown Bat	Eastern Gray Squirrel	River Otter
Black Bear	Eastern Pipistrel Bat	Short-tail Weasel
Brown Rat	Fisher	Southern Flying Squirrel
Common Gray Fox	Hairytail Mole	Starnose Mole
Common Muskrat	Little Brown Myotis (Bat)	Striped Skunk
Common Porcupine	Long-tailed Jumping Mouse	Virginia Opossum
Common Raccoon	Meadow Vole	White-footed Mouse
Coyote	Mink	White-tailed Deer
Eastern Chipmunk	Red Fox	Woodchuck

Amphibians & Reptile Species Observed in Epping

Eastern Newt (Red-spotted)	Gray Tree Frog	Common Snapping Turtle
Eastern Red-backed Salamander	Green Frog	Spotted Turtle
Spotted Salamander	Wood Frog	Wood Turtle
American Toad	Eastern Painted Turtle	Eastern Ribbon Snake
Spring Peeper	Blanding's Turtle	Common Garter Snake
Milk Snake		

Significant Habitats

All wildlife needs food, shelter, water and space to survive. These life requirements are defined as an animal's habitat. Animals use a variety of strategies to find food, water and shelter in the environment and it is these strategies that determine the habitat needs for each species. Habitat is everywhere, yet some habitat is more important to wildlife than others. Habitat is more significant when it supports a rare species, represents a smaller percentage of the landscape, provides an abundance of food or other resources, provides a buffer for wildlife against the effects of development, and supports several types of habitat.

The following habitat types are considered to be significant in New Hampshire:

- ***Habitat of Rare Wildlife Species –*** examples include bald eagle wintering areas, peregrine nesting cliffs, common loon nesting areas and Great Blue Heron rookeries.

- ***Unfragmented Lands –*** Large tracts of contiguous habitat that include a mix of forests, wetlands, riparian areas or other habitat which support wide-ranging mammals and forest interior birds.

- ***Riparian Areas and Large Wetlands –*** Riparian areas along water courses, especially those areas that connect river corridors, wetlands and unfragmented lands. Large wetlands or wetland complexes that support a variety of wetland dependent wildlife.

- ***Agricultural and Other Open Land –*** Large fields and shrub lands that support species dependent on this open land type. This habitat has been disappearing in Epping as farmland is converted to development or reverts back to forest.

- ***Other Unique or Critical Habitats*** **-** This habitat type is divided into the following groups:
  - Habitat that is rare statewide, for example pine barrens;
  - Habitat that is rare in a particular geographic area, for example mountains in southern New Hampshire;
  - Uncommon land features which provide unique conditions for certain species, for example denning sites in rock piles;
  - Habitat critical to certain species during a particular phase of their life cycle or a particular time of the year. Examples include vernal pools, waterfowl migration stop-

over sites and deer wintering areas, all of which are found in Epping. Large wetlands are valuable stop-over sites for migrating waterfowl in the spring and fall. Canada and Brant geese, mergansers, pied-billed grebes, mallards, and many other species rest and feed here. Migrating geese also feed in the stubble of Epping cornfields in the late fall. Seeps or seepage wetlands are generally small areas (less than ¼ acre) that occur where groundwater comes to the surface. These sites are the first to green-up in the spring and are frequented by a variety of wildlife for that reason. Dependent species include bear, deer, moose, turkey, salamanders, migrating birds and woodcock.

Fisheries

Fishing is a popular hobby and Epping's fisheries are an important natural resource. It is important to keep in mind that many of our fish have been contaminated by mercury and other pollutants. Before eating any fish, consult with the most recent advisories as to what is a safe consumption level.

Figure 14
Freshwater Fish Species
May be present in Epping

Brook Trout	Largemouth Bass	Yellow Perch
Rainbow Trout	Pickerel	Briddle Shiner
Brown Trout	Horned Pout	
Lake Trout	White Perch	
Whitefish	Black Crappie	
Smallmouth Bass	Blue Gill	

Recommendations to Protect Wildlife Habitat:

Epping's wildlife, and the habitat that it requires, is an important component of the rural character of the town that is so important to its residents. Because the habitat maps highlight large, unfragmented blocks of land and wetlands, conserving key wildlife habitats will also work towards preserving rural character and water quality.

- Partner with land conservation organizations and surrounding municipalities in the region to protect critical areas identified by the Southeast Land Trust of New Hampshire, NH Fish and Game, Audubon Society of NH, and the Society for the Protection of NH Forests.

- Support the protection of riparian corridors by enforcing wetland buffer protections in the Town's Wetland Ordinance and educating landowners about the important role riparian buffers have in the protection of water quality and wildlife habitat.

- Continue to protect large parcels of unfragmented land from development.

- Minimize impacts to significant habitat during development by continuing to require that a natural resource inventory be completed prior to subdivision or site plan approval.

- Apply principles of conservation design to minimize the impacts of development and preserve natural undeveloped lands.

- Work with surrounding communities to identify and conserve wildlife corridors.

- Identify and conserve wildlife corridors through parcels to facilitate wildlife movement across developed areas.

- Educate the public about the value of wildlife habitats.

Regional and Statewide Natural Resource Inventories

New Hampshire Fish and Game Wildlife Action Plan (WAP) - The WAP is the most comprehensive wildlife assessment ever completed in New Hampshire, identifying 123 species and 27 habitats in greatest need of conservation. The purpose of the WAP is to provide decision makers with information that encourages sustainable development in sensitive wildlife areas, and considers proactive strategies for land protection. The WAP may be found at the following website:
http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm

Wildlife habitat is categorized in the following ways in the WAP:

- Tier 1 – Highest quality habitat in NH
- Tier 2 – Highest quality habitat in a biological region
- Tier 3 – Supporting landscapes

The amount of acres in each of these four categories was calculated for Epping, as was the number of acres conserved in these categories. It is important to note that almost 17% of Epping is classified by NH Fish and Game as Tier 1 – the highest quality habitat in the state. Figure 15 lists this information, seep Map 2 for details.

Figure 15
Summary of Wildlife Action Plan Habitat Tiers

Tier 1	2634 acres
Tier 1 Acres Conserved	1146 acres
% of Tier 1 Acres Conserved	43.5%
Tier 2	5124 acres
Tier 2 Acres Conserved	1846 acres
% of Tier 2 Acres Conserved	36%
Tier 3	2829 acres
Tier 3 Acres Conserved	1056 acres

% of Tier 3 Acres Conserved	37.3%

Habitat Types Found in Epping

- **Appalachian Oak-Pine Forests** – Epping has 7,064 acres of this habitat type, which is characterized as being found mostly below 900 feet elevation in southern New Hampshire and along the Connecticut River in western New Hampshire. The nutrient-poor, dry, sandy soils and warm, dry, climate influences the typical vegetation including oak, hickory, mountain laurel, and sugar maple. Many wildlife species use these forests for part or all of their life cycle including whip-poor-wills, black bears, northern myotis, and state endangered eastern hognose snakes. Traditionally, Appalachian oak-pine forests are influenced by frequent fires, which change the age structure of the forest. The diverse age and structure of the forest help to promote wildlife diversity. Intense development pressure particularly in the southeast corner of New Hampshire has dramatically reduced naturally occurring fires and increased fragmentation of this forest type. Incorporating habitat conservation into local land use planning, protecting unfragmented blocks, and adopting sustainable forestry are a few examples of conservation strategies for Appalachian oak-pine forests.

- **Hemlock Hardwood-Pine Forests** – Epping has 2,801 acres of this habitat type, which is comprised of mostly hemlock, white pine, beech, and oak trees. Since this is a transitional forest, it can occur at different elevations and over different types of soil and topography, so the composition of vegetation can be variable. This forest type is the most common in New Hampshire and covers nearly 50% of the state and provides habitat for numerous wildlife species such as the cerulaean warbler, eastern pipistrelle, and bobcat. Many of the species that use this habitat type require large blocks of unfragmented forest such as the northern goshawk and black bear. Since this forest type is so common, it is sometimes overlooked in conservation efforts. Development and fragmentation is a huge threat to the continued existence of hemlock-hardwood-pine forest. Some conservation strategies for hemlock-hardwood-pine forests are incorporating habitat conservation into local land use planning, protecting unfragmented blocks of land, and educating landowners.

- **Grassland** – Epping has 1700 acres of this habitat type, which is comprised of grasses, sedges, and wildflowers with little to no shrubs and trees. The most common grassland habitats are airports, capped landfills, wet meadows, and agricultural fields such as hayfields, pastures and fallow fields. Pre-colonial grasslands in New Hampshire were probably only maintained by beaver and fires started by lightening and Native Americans. The numerous agricultural lands maintained by early European settlers provided ideal habitat for some wildlife species that need grassland habitat. As these agricultural lands were abandoned, these populations began to decline and are now on the state endangered list such as the eastern hognose snake, northern harrier, upland sandpiper and on the state threatened list such as the grasshopper sparrow. Other species also

benefit from these open grass fields such as wood turtles and numerous species of butterflies. Development and natural forest succession have reduced grassland habitat in the state. Grasslands require maintenance and must be mowed to prevent them from becoming shrublands or forests. Only 8% of NH grasslands are currently under conservation easements. Reclaiming and maintaining grasslands are two important conservation strategies for grassland habitats. Many grassland and potential grassland habitat are on private land and landowners can help restore and conserve them.

- **Floodplain Forest** – Epping has 524 acres of this habitat type, which occurs in valleys adjacent to river channels and are prone to periodic flooding. Also referred to as riparian forests, they support diverse natural communities, protect and enhance water quality by filtering and sequestering pollution, and control erosion and sediment. Many wildlife species use these forests at some point in their life cycle. It would not be uncommon to find red-shouldered hawks, veery, or chestnut-sided warblers breeding in floodplain forests. Evidence of beaver, mink, or otter can usually be found along the water's edge. Other wetlands, like swamps and vernal pools, can be found in floodplain forests and these areas are particularly important for Jefferson salamanders, northern leopard frog, wood turtles, and state endangered Blanding's turtles. Since these species, like most wildlife species, use a variety of habitats, not only is a floodplain forest important but the adjacent upland is also crucial for these species. Floodplain forests with their rich soils have been converted to open farmland for centuries, so many floodplains are no longer forested wildlife habitat. Other human activities have threatened these habitats including residential and commercial development along rivers and the installation of dams which have altered the natural flooding regime. Floodplain habitats are particularly vulnerable to invasive plants because the frequent disturbances from flooding give aliens opportunities to establish, and because these species tend to thrive in the nutrient rich soils characteristic of floodplains. Annual flooding can control these invasives, if the natural flood regime is not altered. Some conservation strategies for maintaining this unique habitat type in the state are managing river impoundments to simulate natural water flows, removing dams where possible, and protecting the highest quality sites. Many floodplain forests are on private land and landowners can help restore and conserve them.

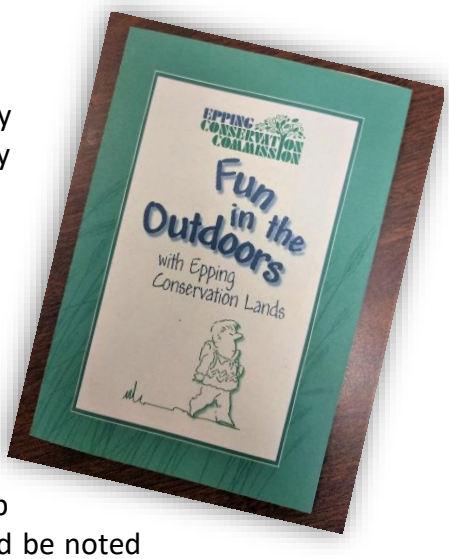
- **Marsh and Shrub Wetlands** – Epping has 769 acres of this habitat type, which is characterized by a broad range of flood regimes, sometimes controlled by the presence or departure of beavers, but mostly controlled by groundwater. This system, which is an important food source for many species, is often grouped into three broad habitat categories: wet meadows, emergent marshes, and scrub-shrub wetlands. Marsh and shrub wetlands filter pollutants, preventing them from getting into local streams, and help hold water to reduce flooding. Many wildlife species use marsh and shrub wetlands including common species like red-winged blackbirds, beavers, and painted turtles. Marsh and shrub wetlands are also critically important for state endangered Blanding's turtles, New England cottontails, northern harriers, ringed boghaunters, and sedge wrens plus state threatened spotted turtles and pied billed grebes. Development is a threat to these

habitats mostly from driveways and roads that fragment wetlands or change the flow of water. The loss of an upland habitat around a marsh or shrub wetland also increases the amount of pollution and sedimentation threatening the habitat. Another constant threat to marsh and shrub wetlands is invasive plants such as purple loosestrife and Japanese knotweed that compete with native vegetation. Some conservation strategies for marsh and shrub wetlands are restoration and protection of these important habitats. Many marsh and shrub wetlands are on private land and landowners can help restore and conserve them.

- **Peatlands** – Epping has 282 acres of this habitat type. Peatland habitats are extremely important for carbon sequestration on a local and global scale. The water in peatlands has low nutrient content and typically high acidity caused by limited groundwater input and surface runoff. These environmental conditions are such that plant and animal material take a very long time to decompose. This organic material contains carbon and other nutrients, storing it away and slowly releasing it into the atmosphere. Drainage and destruction of peatlands releases this carbon into the atmosphere quicker, increasing greenhouse gases today. Conservation of the 11 different natural communities that comprise peatlands is also vital to the continued existence of many rare plant and wildlife species in New Hampshire. The state endangered ringed bog haunter uses peatlands and the surrounding uplands in the southern part of the state. The northern bog lemming inhabits burrows in the sphagnum moss and associated grasses. Typical vegetation in a peatland includes sphagnum moss, leather leaf, northern white cedar, and American larch. Threats to peatland habitats are development, altered hydrology (amount and flow of water), and unsustainable forest harvesting. Non-point source pollutants, such as road salt, lawn fertilizers, and pesticides, also threaten this habitat by altering the acidity and nutrients. Establishing buffers around this habitat is one conservation strategy that will help minimize the threats to peatland habitats.

Profiles of all these habitat types may be found at the following website:
http://www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/habitat_types.htm

XVII. Conservation Land



Epping has many parcels of land that have been permanently protected from future development due to the actions taken by landowners, land conservation organizations, and the State of New Hampshire. This protection takes the form of easements placed on the land that restrict the type of activity that can take place on the parcel and the sale or donation of the fee simple ownership of a parcel to a land conservation organization or the Town.

Figure 13 below indicates the name and size of all Conserved Land in Epping, see Map 3 for the location of each parcel and Map 12 for information on trails that exist on some parcels. It should be noted that not all conservation land is open to the public.

In recently, the Epping Conservation Commission has been making efforts to specifically identify the recreation and access status of conservation land in the town. Part of the goal of this effort is to better identify trail networks in town and to establish new trails where possible.

Figure 13
Conservation Land in Epping

NAME	Acres	NAME	Acres
NLI, East Coast Land	4.73	**Manchester-Portsmouth RR Bed**	62.60
Chapman Woods Open Space	0.00	**Lamprey River Forest**	107.96
Piscassic River WMA	43.36	**Scout Field**	12.88
Crosbie Easement	0.00	**Mary Blair Park**	8.24
Reinhold	65.41	**NLI - Cemetery Land**	5.98
Flag Hill Farmstead Area	0.00	**Ledgewood Conservation Area**	25.00
Two Rivers Wildlife Preserve	75.24	**Folsom Conservation Area**	28.40
Parsons	23.32	**Low**	13.43
Rosemarie Dumas Preserve	7.22	**Epping Crossing Mitigation Area**	5.46
Dimond Hill Easement	114.41	**Piscassic River WMA**	65.36
Clarke I (Farmland)	23.88	**Epping, Town of (Birch Rd)**	16.00

Sanborn Memorial Forest	29.81	**Low**	45.15
Cramer / Evans Easement	0.00	**Epping Crossing Mitigation Area**	22.23
George Falls Woods	14.93	**Epping Crossing Mitigation Area**	72.97
Tilton Bridge Landing	12.11	**Sweeney**	23.83
Hoar Pond Extension	25.26	**Epping Crossing Mitigation Area**	6.02
UNH - Hoar Property	70.86	**Town of Epping Land**	6.22
Camp Hedding Easement	19.71	**Crossroads Easement**	3.43
RCCD Lamprey Riverbend	36.02	**Epping Crossing Mitigation Area**	11.22
Fresh River Corner	6.52	**Birch Road Trust (Jones)**	11.82
Water Tower Mitigation	5.10	**Goodrich Marsh WMA**	17.19
Lamprey River Wildlife Preserve	27.35	**Wheelabrator Epping**	8.32
Primack	88.70	**NHDOT - Piscassic River**	12.99
Goodrich Marsh WMA	15.09	**Goodrich Marsh WMA**	40.63
NRCS_WRP_Sullos	11.67	**Orchard View Open Space A**	29.27
Dow-Fehsenfeld	72.79	**Longmeadow East**	31.52
Brown, P	11.43	**Longmeadow East (Farm Deed Restriction)**	12.38
Clarke II (River/Wildlife)	62.30	**Longmeadow West**	66.30
NRCS_WRP_Friel	21.94	**Century Oaks Open Space B**	20.49
NRCS_WRP_Friel	482.41	**Century Oaks Open Space A**	37.00
NRCS_WRP_Friel	12.08	**Leddy Fields Open Space #3**	3.04
NRCS_WRP_Friel	8.89	**Leddy Fields Open Space #1**	3.67
Langdon	46.77	**Leddy Fields Open Space #4**	0.34
Parke	109.90	**Leddy Fields Open Space #2**	3.61

Pawtuckaway RivRes: Pernokas Tract	34.06	**Folsom Church Mitigation**	2.27
Pawtuckaway RivRes: Bond Tract	3.87	**Pawtuckaway RivRes: Bell (Primack II) Trct**	6.11
Pawtuckaway RivRes: Hauser Tract	7.18	**Seymour-Fry**	2.98
NRCS_WRP_Stingy	81.49	**Burley, Jane**	16.44
Pawtuckaway RivRes: Bell Tract	47.95	**Dennoncour**	9.50
Pawtuckaway RivRes: Bell (Dow II) Tract	8.54	**Dennoncour**	6.08
Breckenridge Estates Open Space	11.32	**Smith, H.R. 1**	0.37
Breckenridge Estates Open Space	31.44	**Smith, H.R. 2**	0.62
Breckenridge Estates Open Space	16.96	**NRCS_WRP_Burley**	11.22
Orchardview Subdivision Open Space B	20.79	**NRCS_WRP_Mcphee**	63.15
NRCS_WRP_Burley	108.89	**NRCS_WRP_Parke**	55.19
NRCS_WRP_Burley	99.38	**NRCS_WRP_Straw**	143.00
NRCS_WRP_Burtt	98.80	**G-3 Trust**	17.28
		Parke #2	3.61

Current Use Assessment – NH RSA 79-Current Use Assessment provides a property tax incentive to all qualifying landowners who agree to maintain their land in an undeveloped condition. This assessment is based on the capacity of the land to produce income in its current use-whether it is managed farm or forest, or unmanaged open space. Current Use is the cornerstone of the state's land conservation efforts, with over half the land in New Hampshire is enrolled in this valuable program.

The minimum requirements for land to be enrolled in the Current Use program are:

- 10 or more acres of land that is undeveloped and with no structures;
- A tract of wetland of any size less than 10 acres; wetlands larger than 10 acres are not eligible because of state regulations;
- A certified Tree Farm of any size;

- A tract of undeveloped land of any size that is actively devoted to the growing of agricultural or horticultural crops have an annual gross income from the sale of crops totaling at least $2,500.

It is important to note that land enrolled in current use is not deed restricted and may be eligible for development. For more information, visit www.nhspace.org

Recommendations regarding Conservation Land:

- Maintain communication with large landowners in town about conservation objectives.
- Organize nature walks in town.
- Consider building nature trails on conservation land where permitted and continue to develop maps of existing trail networks.
- Collaborate with other towns within the Lamprey River Watersheds concerning conservation and recreation.

Recommendations

Epping enjoys generous natural resources which will continue to thrive under proper stewardship. Given its unique setting among communities that have experienced much greater development, residents' actions now will make sure that these resources flourish and endure. This effort will reap everlasting benefits for the town and the entire region.

Recommendations:

1. Provide information and education using the Natural Resources Inventory (NRI) as a tool.
2. Incorporate aspects of the NRI into planning at the town and regional levels.
3. Facilitate open discussions with landowners to promote conservation easements, wildlife habitat, farming, forestry, and recreation.
4. Foster attitudes of long-term land and resource stewardship for public and private lands.
5. Encourage collaboration among adjacent and neighboring landowners for mutual benefits.
6. Protect lands along the rivers and River.
7. Expand conservation lands in town to 25% by 2025.

8. Consider a town bond for purchasing conservation easements. Such a bond would be appropriate when the school bond has been fully paid.

9. Develop relationships with established conservation partners and funding sources such as land trusts, government agencies, and UNH Cooperative Extension.

10. Establish a Epping website to allow greater collaboration on these efforts.

11. Enjoy! Help people experience all the natural beauty that the town has to offer.