Natural Resources Inventory
of the
Town of Charlestown, New Hampshire

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Upper Valley Lake Sunapee Regional Planning Commission

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1. Introduction

Charlestown is an historic town on the Connecticut River, with a residential, agricultural, and rural landscape. Charlestown covers 38 square miles in western New Hampshire and has several miles of shoreline on the Connecticut River. Charlestown has nearly 5,000 residents; the 2007 estimate from the New Hampshire State Data Center is 4,874 (NH Office of Energy and Planning (NHOEP, 2008). The Connecticut River is the dominant feature of the town's landscape, in terms of history, recreation, and aesthetics. The valley and hills to the east of the river provide a diverse array of natural resources, including substantial acreage of farmland.

Charlestown relies on its natural resources for drinking water, agricultural production, construction materials, wood-based heat, and other necessities. The natural resources of the town also promote a high quality of life through the country setting abundant with wildlife, scenic vistas, and recreational opportunities. As the population of the town is projected to rise significantly in the next twenty-five years, from 4,874 estimated in 2007 to 6,210 in 2030 (NHOEP, 2008), the Town of Charlestown will certainly face greater pressure on its natural resources. Sullivan County was largely exempt from the rapid population growth of the other southern counties in New Hampshire during the past twenty years (Society for the Protection of New Hampshire Forests (SPNHF), 2005), but that trend may not continue into the future. The pace of land development is expected to stay strong statewide, as New Hampshire's population is expected to increase another 28% between 2000-2025 (SPNHF, 2005).

With these future challenges and opportunities in mind, the Charlestown Conservation Commission states the goal of this Natural Resources Inventory:

> *to identify critical natural resources and resource areas, and*
>
> *to prioritize protection and conservation efforts,*
>
> *so that informed decisions can be made about future land use, appropriate development, and land conservation.*

This Natural Resources Inventory contains a visual and written description of the natural resources within the town of Charlestown, as well as an analysis of the current and potential future protections for these resources. The information contained in this report can and should be used to:

- Educate and promote awareness about Charlestown's natural resources,
- Document current conditions so that changes over time can be assessed,
- Develop land conservation priorities and a plan for Charlestown,
- Provide a basis for master planning, regulation development, and planning decisions (Auger and McIntyre 1991, revised by Stone, 2001).

The status and significance of natural resources and their protections do change over time, and this inventory should not be construed as a “final product.” The inventory includes a summary of what exists at the current time and recommends actions for the future; this document should be revisited periodically to update the inventory with newly available data, protections, and priorities for natural resources conservation.

2. Methodology

The Charlestown Conservation Commission developed this Natural Resources Inventory, with technical assistance from the Upper Valley Lake Sunapee Regional Planning Commission, in fall and winter 2008. The first phase involved a basic inventory, consisting of readily available data. With that information, a cooccurrence analysis was performed to identify areas of high resource value.

Information on the natural resources in Charlestown was derived both from statewide data sources and local knowledge. Corrections to the statewide data were made by the Charlestown Conservation Commission. This information is represented descriptively in the text of the report and also visually on maps, included as appendices to this report. Information for the following natural resources and base geographic features was compiled:

- Political boundaries
- Infrastructure – roads, railroads, and utility lines
- Surface water features – rivers, streams, lakes, and ponds
- Topography
- Land cover/land use
- Land cover categorized by habitat type
- Soils – capabilities for forest and agricultural production, and hydric soils
- National Wetlands Inventory
- Aquifers
- Public water supplies
- Wellhead protection areas
- Watershed boundaries
- Natural Heritage Bureau rare and threatened species
- Highly ranked wildlife habitat from the Wildlife Action Plan
- Public and conserved land protected from development
- Tax parcels, including those in current use

Detailed information about the natural resources data, including source, scale, and attributes, are described in Appendix A: Data Source Documentation.

Digital maps were created by Upper Valley Lake Sunapee Regional Planning Commission, using ArcGIS 9.2. By utilizing the technology of GIS (geographic information systems), questions about the data could be asked, including area calculations, distance measurements, identification of habitat type, and analysis of unfragmented land.

3. Natural Resources

3.1. Geographic Location and Topography

The town of Charlestown is located on the western border of New Hampshire in Sullivan County. Charlestown is bordered by seven towns:

- Unity, Acworth, and Langdon to the east,
- Walpole to the south,
- Claremont to the north, and
- the Vermont towns of Springfield and Rockingham to the west.

The most prominent geographic feature for the town is the Connecticut River, which forms the western edge of town and separates New Hampshire and Vermont. Within the town, there are several villages and places, including North Charlestown, Charlestown, and South Charlestown.

The Connecticut River lies entirely within the state of New Hampshire; the mean highwater line on the western shore marks the state boundary. Therefore, roughly 1,400 acres of the Connecticut River are located within the town boundaries of Charlestown. Charlestown's total area of 38 square miles is 94% land and 6% water. Besides the Connecticut River, there are many small tributary streams but few ponds in Charlestown.

Table 1. Land and water area in Charlestown

Category	Area (sq mi)	Acreage	% of Town
Inland Waters	2.2	1,408	5.8%
Land	35.8	22,912	94.2%
Total	**38**	**24,320**	**100.0%**

Source: NH ELMI, 2008

The lowest elevation in town is along the river, at just under 300 ft above sea level. The highest elevation in town is 1,683 ft above sea level at the top of Sams Hill, near South Hemlock Road. Other hills and mountains include:

- Perry Mtn,
- Calavant Hill,
- Fall Mtn,
- Prospect Hill,
- Oak Ridge,
- Hubbard Hill,
- Rattlesnake Hill,
- Perry Hill,
- Oak Hill, and
- Page Hill.

Charlestown is ecologically linked to its neighboring towns by the Little Sugar River watershed, and to its neighboring states by the Connecticut River watershed.

Charlestown falls on the edge of two different natural community types, due to the many physical and biological differences between the Connecticut River Valley and the hilly uplands to the east, known as the Sunapee Uplands. The vast majority of Charlestown falls within the Upper Connecticut River Valley region, characterized by river terraces, deep deposits of glacial outwash or glacial lake sediment, and metamorphic bedrock. The Sunapee Uplands, where the bedrock is composed of granite, is characterized by monadnocks (isolated peaks of resistant granite), numerous lakes and streams, and shallow, rocky soils (Sperduto and Nichols 2004).

3.2. Land Cover and Land Use

Residential and commercial development is concentrated in three village areas, North Charlestown, Charlestown, and South Charlestown. These three village areas are in the relatively flat river valley. Rural residential development is dispersed throughout town along the few main roads that cross the hills to the east of the river valley. Agriculture is primarily located in the river valley, but there is some farmland in the hills. In 2005, developed and cleared/bare land covered only about 5% of the town's land area, and agriculture covered roughly 12%, according to the Northeast Land Cover analysis (NOAA, 2006).

Table 2. Land Use/Land Cover in Charlestown

Land Use/Land Cover Class	Acreage	% of Town
Developed	1,245	5%
Agriculture	2,822	12%
Forest	17,947	78%
Wetland	749	3%
Bare Land	40	0%
Total*	**22,803**	**76%**

** - The calculated total area is similar, but not identical, to the total land area of Charlestown, due to the analytical methods used and the accuracy of the source data, which is from satellite imagery.*

Source: Northeast Land Cover, 2006

Outside of the river valley, Charlestown remains heavily forested. Over three-quarters of the land area is under forest cover. The land use classification used by the Wildlife Action Plan (New Hampshire Fish and Game Department, 2006) separates forested lands into broad ecological communities known as matrix forest types. Roughly half of Charlestown's land area is covered by hemlock-hardwood-pine forest; the second-largest forest type is Appalachian oak-pine, which grows in warmer, drier areas than the hemlock-hardwood-pine forest.

Table 3. Matrix Forest Types in Charlestown

Matrix Forest Type	Acreage	% of Charlestown
Appalachian oak-pine forest	3,089	13%
Hemlock-hardwood-pine forest	11,797	51%
Lowland spruce-fir forest	82.6	<1%
Northern hardwood-conifer forest	190	1%
Total of Major Habitat Types	**17,323**	**76%**

Source: Wildlife Action Plan, 2006

In addition to these major forest types, there are a variety of medium and small-scale habitats within Charlestown. These habitat types do not cover large areas, but show the heterogeneity of the natural landscape. Large grasslands over 25 acres (i.e., farm fields) cover 13% of the land area, primarily in the Connecticut River Valley. Wetland complexes, either of the marsh or peatland type, cover roughly 467 acres, or 2% of the land area. Marshes are scattered throughout town in stream valleys.

Table 4. Summary of Medium and Small Scale Habitats in Charlestown

Land Cover Type / Habitat Class	Acreage	% of Charlestown
Cliffs*	35	<1%
Ridge*	241	1%
Large grasslands (over 25 acres)	3,089	13%
Floodplain forest	217	1%
Pitch pine forest	20	<1%
Marsh-shrub wetland complex	438	2%
Peatlands	29	<1%
Total of Major Habitat Types		

** - Reported acreage for cliff and ridge community types is intentionally exaggerated. These areas have extraordinary ecological value; therefore the New Hampshire Heritage Bureau generalizes the data to protect these areas.*

Source: Wildlife Action Plan, 2006

Both the Northeast Land Cover analysis and the Wildlife Action Plan habitat assessment rely heavily on satellite imagery; there are inherent limitations to the accuracy of these estimates. An example of a misclassification is a single house with a small lawn surrounded by forest would likely be classified as forest, rather than developed. Therefore, the acreage reported for each land use, forest type, or habitat class should be taken as an estimate, not as a direct measurement. Further detail on agriculture, forests, and wildlife habitat is provided in other sections of this report.

3.3. Surface Waters

All surface waters in Charlestown ultimately drain to the Connecticut River which flows into the Atlantic Ocean. Some of Charlestown's streams flow directly into

the Connecticut River, while others flow into the Little Sugar River or the Cold River. A watershed is the area of land that drains to a certain waterbody. The US Geological Survey breaks Charlestown's river and streams into four watersheds:

- North Charlestown Tributaries to the Connecticut River,
- Little Sugar River,
- South Charlestown Tributaries to the Connecticut River, and
- Lower Tributaries to the Cold River.

The South Charlestown Tributaries watershed covers just over half of the town's total area; streams within this watershed include Beaver Brook, Clay Brook, Dickerson Brook, Hackett Brook, Jabes Hackett Brook, and Meadow Brook.

The North Charlestown Tributaries watershed covers roughly one-quarter of the town's total area; streams within this watershed include a second stream named Beaver Brook, Hubbard Brook, Ox Brook, and Smith Brook.

The Little Sugar River originates in the town of Unity, immediately to the west of Charlestown. There are few streams that join the Little Sugar River in Charlestown; the only named stream on USGS maps is Swett Brook. The Little Sugar River flows into the Connecticut River just south of North Charlestown.

The Cold River has its headwaters at the outflow of Crescent Lake on the border of Unity and Acworth and flows southwest through the towns of Acworth, Alstead, and Langdon before entering the Connecticut River in Walpole. In the southwestern corners of Charlestown, Great Brook, Little Brook, and Mountain Brook drain to the Cold River.

Table 5. Watersheds within Charlestown

Name of Subwatershed	Acreage	% of Town
North Charlestown Tributaries	6,693	28%
Little Sugar River	2,538	10%
South Charlestown Tributaries	13,148	54%
Lower Tributaries – Cold River	1,965	8%
Total	**24,344**	**100%**

Source: New Hampshire Hydrography Dataset, 2008

The Connecticut River has formed several unique natural features in Charlestown. Great Meadow and Lower Meadows are extensive marshland on the eastern edge of the river. Meany's Cove is a protected embayment near South Charlestown, and Glidden Island is a long narrow island near North Charlestown. There are also other smaller marshes, oxbows, and coves that are not named on the US Geological Survey maps.

Charlestown is rich in streams and rivers, but has few ponds. Hall Pond is the largest waterbody in town, at 14.5 acres, and is a part of the public water supply for Town residents.

Table 6. Public Waters in Charlestown

Waterbody Name	Towns Bordering	Surface Elev.	Acreage
Hall Pond	Charlestown	1,010 ft	14.5
North Mountain Pond	Charlestown Langdon	820 ft	10.3
Total Acreage of Public Water Bodies			**24.8**

Source: NH DES Official List of Public Waters, 2008

3.4. Groundwater

Charlestown's location in the Connecticut River Valley makes it especially rich in groundwater resources, in the form of stratified-drift aquifers. Stratified-drift aquifers are sand and gravel deposits from glacial lakes and rivers through which water can flow in large quantities. Only 10% of the State of New Hampshire is underlain by aquifers, but a full 25% of Charlestown's land and water is underlain by aquifers (Map 6). Most of the aquifer in Charlestown has low transmissivity, less than 2,000 square feet per day, but there are some areas of very high transmissivity (Moore *et al.* 1994). Stratified drift aquifers have the greatest potential for development for community wells, but most residential wells are drilled into fractured bedrock. An analysis completed by NH Department of Environmental Services identified potential community well sites as those aquifers with high transmissivity in areas away from potential contamination sources, such as roads, residences, and commercial development. Two areas in Charlestown were identified as potential community well sites, a large area in North Charlestown west of Route 12A and a smaller area in Lower Meadows.

Residents and businesses in Charlestown derive their drinking water from a variety of sources. The North Charlestown Water Department and Charlestown Water Works serve residents in the two major village areas; Charlestown public schools are also served by these water systems. In addition, there are six other public water supplies registered with the state Department of Environmental Services.

Table 7. Public Water Supplies in Charlestown

Public Water Supply Name	System Type	# Served	Well Type
Blueberry Hill MHP	Community	73	3 Bedrock Wells
Camp Goodnews	Transient	150	Artesian Well
Charlestown Water Works	Community	2,500	2 General Packed Wells
Connecticut River MHP	Community	50	General Packed Well
Meadowview Apartments	Community	58	2 Bedrock Wells
North Charlestown Water Dept.	Community	325	2 Gravel Wells
Windy Acres Cooperative Inc.	Community	180	2 Bedrock Wells

Definitions:
Public water system *(PWS) is defined as a system that provides water via piping or other constructed conveyances for human consumption to at least 15 service connections or serves an average of at least 25 people for at least 60 days each year.*
Community Water System : *A water system which supplies drinking water to 25 or more of the same people year-round in their residences.*
Transient Water System : *A water system which provides water in a place such as a gas station or campground where people do not remain for long periods of time. These systems do not have to test or treat their water for contaminants which pose long-term health risks because fewer than 25 people drink the water over a long period. They still must test their water for microbes and several chemicals.*
Non-Transient Water System : *A water system which supplies water to 25 or more of the same people at least six months per year in places other than their residences. Some examples are schools, factories, office buildings, and hospitals which have their own water systems.*

Source: NH Department of Environmental Services, 2008

3.5. Wetlands

The State of New Hampshire defines wetlands by three characteristics: hydrology, soils, and vegetation. All three must be met in order to define an area as a wetland, according to the following definition, "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration of sufficient to support, and do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The National Wetland Inventory (NWI) was an effort undertaken by the US Fish and Wildlife Service to catalog wetlands over the entire United States. Not all wetlands were mapped, due to the limitations of the study methodology and scope of work. Therefore, the NWI underestimates the total amount of wetlands, especially small wetlands. Hydric soils are those soils that have developed under saturated conditions, and are one of the three indicators of a wetland under the New Hampshire definition. By looking at both the NWI data and the hydric soils data, one can obtain a general appreciation for the extent and location of wetlands in Charlestown. NWI wetlands cover 617 acres, or 3% of the land area of Charlestown; hydric soils cover 1,126 acres, or 5% of the land area.

There is a wide variety to the types of wetlands; they may be forested, grassy, or covered in shrubs, and may be connected to a stream, lake, groundwater spring, or separate and fed only by rainwater. This variety in wetlands leads to a diversity of wetland functions; some wetlands are more important for flood control or nutrient retention, while other may be better for wildlife. Table 8 summarizes the major wetland types, defined by vegetation, in Charlestown.

Table 8. Wetland types in Charlestown

Wetland Type	Acreage
Emergent (e.g., cattail, reeds)	125
Forested	168
Scrub-shrub	167
Other	157
Total of Major Habitat Types	**617**

Source: National Wetlands Inventory, 1992

Generally not included in the National Wetlands Inventory is a special type of small wetland, a vernal pool. This is an intermittently flooded small pond that is filled with water in the spring and early summer, but dries up completely during the rest of the year. Vernal pools provide critical breeding habitat for many amphibians, as the intermittent nature of these ponds do not support aquatic predators, like fish. Amphibians breeding in vernal pools in New Hampshire include marbled salamanders, wood frogs, spotted salamanders, and Jefferson or blue-spotted salamanders. These species depend on vernal pools, which make this wetland type a highly important resource. Members of the

Conservation Commission are aware of three vernal pools on town-owned land; there are undoubtedly many more undocumented vernal pools in Charlestown.

3.6. Agriculture

New Hampshire has relatively scarce agricultural resources compared to more fertile parts of the United States. Glaciers scoured the land down to bedrock 10,000 years ago and soil has been slowly rebuilding since then. Soils tend to be nutrient-poor, shallow, and rocky, and much of the terrain is hilly, which limits the agricultural uses of the land. One exception to the dominant soil composition in New Hampshire exists in the major river valleys, where ancient glacial lakes accumulated fine-grained sediments. The Connecticut River Valley is underlain by deep deposits of silt, sand, and gravel; these deep, well-drained soils on gently sloping land provide large areas of good farmland.

Because of the long time required for soil development (tens of thousands of years), agricultural soils should be considered a nonrenewable resource. In the Sullivan County Soil Survey, there are three classes of agricultural soils, so chosen by their relative value for raising crops or livestock:

- Prime farmland
- Farmland of statewide importance
- Farmland of local importance.

These classes represent the capability of the soil for agricultural production, and not the current use of the land.

Prime farmland soils, or the best soils for the production of food, feed, fiber, forage, and oilseed crops, have been designated for the purpose of carrying out the provisions of The Farmland Protection Policy Act of 1981. This Act was established to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. Less than 2% of New Hampshire soils are classified as prime farmland soils. In Charlestown, 9% of the land (1,964 acres) is considered prime farmland, which is well above average.

Farmland of statewide importance is the second tier of agricultural soil classification. Criteria for defining and delineating farmland of statewide importance are determined by a state committee. The third tier of important agricultural soils is farmland of local importance. The County Conservation District Board determines which soil units are locally important. These two soil classifications include soils that are useful for agricultural production, but have some limitations, such as stoniness, nutrient limitations, or excessive drainage, that preclude their designation as “prime farmland.” The extent of agricultural soils in Charlestown is summarized in Table 9.

Table 9. Agricultural Soils in Charlestown

Agricultural Soil Class	Acreage	% of Town
Prime (federally designated)	1,964	9%
Of Statewide Importance	1,966	9%
Of Local Importance	3,735	16%
Total	**7,665**	**33%**

Source: Sullivan County Soil Survey

3.7. Forest Resources

More than three-quarters of Charlestown's land area is under forest cover, primarily of a mixed hemlock-hardwood-pine forest type (see Section 3.2 Land Use and Land Cover for detailed statistics). Several parcels of land are managed for forest production, including state and town forests and some privately-held tracts of land. However, the soil types that are most favorable for tree growth cover only 33% of the town's land area.

Each county soil survey classifies soil types by their capability to support sufficient tree growth for commercial forestry operations. which are broken into 5 classes: IA, IB, IC, IIA, and IIB. The dominant tree species on these soil types varies depending on the successional stage of the forest or stand. Charlestown has significant acreage of all Group I soils, but only Group IIB soils.

Table 10. Important Forest Soils in Charlestown

Forest Soil Group	Acreage	% of Town
IA	5,160	23%
IB	560	2%
IC	820	4%
IIA	--	--
IIB	1,126	5%
Total	**7,665**	**33%**

Source: Sullivan County Soil Survey

Group I soils are the best soils for forest management and have the least restrictions on growth or management strategy. Group IA soils are the best soils for hardwood production because they are relatively deep, fertile, and well-drained. Group IB soils are slightly less fertile and sandier than Group IA soils; tree growth is not quite as vigorous. Group IC soils are composed of outwash sands and gravels, and are ideally suited to softwood production.

Group II soils have significant limitations on either tree growth or management because of more severe physical features. Group IIB soils are poorly drained and therefore generally have lower productivity and significant management limitations. A thorough description of each group can be found in Appendix B.

3.8. Sand and Gravel

Sand and gravel are important raw materials for building, roadway maintenance, and other commercial purposes, and soils containing significant deposits of these materials are relatively scarce in New Hampshire. Similar to aquifers, sand and gravel deposits are of glacial lake and river origin, and are concentrated primarily in river valleys or old lake beds. There are five active quarries or pits at the time of this report. Charlestown has a large number of soil types that have a high probability of sand and gravel deposits sufficient for commercial excavation; these soils cover 23% of the town's land area.

Table 11. Sand and Gravel Soils in Charlestown

Soil Group	Acreage	% of Town
Sand Only	3,332	15%
Sand and Gravel	1,797	8%
Total	**5,129**	**23%**

Source: Sullivan County Soil Survey

3.9. Natural Communities

A natural community is defined as a recurring assemblage of plants and animals found in a particular physical environment (Sperduto and Nichols 2004). New Hampshire has a broad diversity of natural communities, which can be organized into five general categories:

- open upland,
- wooded upland,
- wooded wetland and floodplain forest,
- open wetland and riparian, and
- estuarine.

Charlestown, as well as the State of New Hampshire, is primarily of the wooded upland category. The landscape of Charlestown is dominated by the hemlock-hardwood-pine forest type, which covers about 50% of the town's land area. This forest type is considered a transitional forest, between the more southerly forests dominated by oak and pine, and the boreal forest dominated by spruce and fir. Other forest types in Charlestown include the Appalachian oak-pine forest, on south-facing slopes and other warm, dry areas; the lowland spruce-fir forest, in wet, cool mountain valleys and wetlands; and the northern hardwood forest, on well-drained sites with high nutrient levels. There is also a small area of pitch pine forest in Charlestown, which is likely situated on very dry, sandy soil.

Wetlands and floodplain forest cover roughly 4% of Charlestown's land area. The largest areas of floodplain forest are found in North Charlestown west of Route 12A, including areas along Ox Brook and the Little Sugar River. The area around the Charlestown Water Department wells near the river, the mouth of Clay Brook in Charlestown, and a section of Meanys Cove also have areas of floodplain

forest. Several marsh complexes are located along Hackett and Jabes Hackett Brooks, as well as in Great Meadow, and near Hall Pond. The largest wetland in Charlestown is an oxbow lake west of the CEDA Park across Routes 11/12.

There are two open upland communities in Charlestown; both are considered exemplary by the New Hampshire Natural Heritage Bureau. Both the cliff community on Rattlesnake Hill and the ridge community within the Connecticut River State Forest host unique plant species.

3.10. Wildlife

Charlestown's natural landscape is a mixed forest interspersed with grasslands, wetlands, and aquatic habitats. The heterogeneity of the landscape provides habitat for many species of wildlife, both the common and the rare.

Charlestown's riverfront along the Connecticut River is part of the Connecticut River Valley Important Bird Area, a designation assigned by the National Audubon Society for areas crucial to migratory or resident bird populations (refer to Appendix C for more details). One of the hot spots for avian diversity in Charlestown, within this Important Bird Area, is Great Meadow, just south of the wastewater treatment plant. Stan McCumber, a local birding enthusiast, has documented over 180 bird species in Great Meadow. His list is included as Appendix D, and includes species of waterfowl, shorebirds, herons, and passerine (perching) songbirds.

Two other resident naturalists, Jim Fowler and Jan Lambert have documented a large number of plant and animal species around Charlestown. Their records, included as Appendix E, provide an important baseline for the town's wildlife species and populations.

In addition to local sources of information, the state also keeps records of wildlife in New Hampshire. The New Hampshire Natural Heritage Bureau maintains a database of occurrences of rare, threatened, and endangered species and exemplary natural communities. Four animal species on this list have been documented in Charlestown (Table 12). The Natural Heritage Bureau has not exhaustively surveyed the state, so it is possible that more rare species do occur within Charlestown. If town residents have information about rare species occurrences in Charlestown, they should contact the Natural Heritage Bureau.

Table 12. Rare species documented in Charlestown.

Species	Type
American bittern	Bird
Wood turtle	Reptile
Northern leopard frog	Amphibian
Dwarf wedge mussel	Mollusk

Source: Natural Heritage Bureau, 2008

The New Hampshire Fish and Game Department recently completed an analysis of habitat condition, which was published in The Wildlife Action Plan. Habitat types were mapped and then ranked according to their condition and risk of degradation. Measuring habitat condition entailed a lengthy analysis of various factors that impact wildlife, related to the landscape context, biodiversity, human recreation, development and land use, and air and water quality. For a thorough description of this analysis, please refer to the Wildlife Action Plan.

The analysis resulted in four classes:

- Tier 1 - Highest ranked habitat in the state (top 10-15%),
- Tier 2 - Highest ranked habitat in the biological region,
- Tier 3 - Supporting landscapes important to highest ranked habitats, and
- Habitat not highly ranked.

Tier 1 wildlife habitat is of greatest conservation priority because they represent the top 10-15% of habitat in the entire state. Tier 2 wildlife habitat is also of high conservation priority because each part of the state has unique species and habitat types that are important on a regional scale. Tier 3 wildlife habitat helps maintain the high level of biological integrity of Tier 1 and Tier 2 habitat; an example of Tier 3 habitat is the lake surrounding high-quality island habitat.

In Charlestown, Great Meadow, North Pond, and the mouth of the Little Sugar River all had Tier 1 habitat. Tier 2 habitat was more widely spread, and includes habitat in and around the Fall Mountain Reservation, Connecticut River floodplain, and land in the southwestern and central parts of town. More details on Tier 1, 2, and 3 habitat in Charlestown can be found in Table 13.

Table 13. Important wildlife habitat types and areas in Charlestown.

Tier 1 Habitat in Charlestown			
Habitat Type	**Count**	**Acreage**	**General Location(s)**
Floodplain forest	2 locations	68.5	Little Sugar River and Great Meadow
Grasslands	1 location	355.9	Great Meadow
Marsh wetlands	2 locations	63.8	North Pond and Great Meadow
Tier 2 Habitat in Charlestown			
Habitat Type	**Count**	**Acreage**	**General Location(s)**
Oak-pine forest	1 location	470.0	Fall Mountain Reservation
Floodplain forest	9 locations	148.4	Various locations along Connecticut River
Grasslands	1 location	130.2	South Hemlock Rd and south to Langdon
Marsh wetlands	10 locations	146.2	Many in SW and central parts of town
Tier 3 Habitat in Charlestown			
Habitat Type	**Count**	**Acreage**	**General Location(s)**
Oak-pine forest	12 locations	1,118.2	North Charlestown
Cliffs	1 location	n/a	Rattlesnake Hill
Grasslands	6 locations	1,319.2	North Charlestown
Hemlock-hardwood-pine forest	23 locations	10,494.0	One block covers 10,031.8 acres west of Rt. 12; other locations are small, scattered
Marsh wetlands	13 locations	47.1	North Charlestown
Pitch pine forest	5 locations	15.2	North Charlestown, along Rt. 12A
Ridge	1 location	n/a	Connecticut River State Forest

Source: NH Fish and Game's Wildlife Action Plan, 2006

3.11. Current Use

Current use assessment is a program designed to encourage preservation of open space by taxing undeveloped land at its "current use" rather than its "highest and best use." RSA 79A authorizes this program, which allows for a reduced assessment for parcels of:

- field, farm, forest, and wetland of 10 acres or more,
- natural preserves or recreation land of any size, and
- farmland of any size generating annual revenues in excess of $2,500.

As of 2007, 14,426 acres are enrolled in current use, or 63% of the town's land area, according the Department of Revenue Administration's annual current use report. These lands are held by 232 different owners, and constitute 376 parcels. From 2002 to 2007, the acreage of land in current use has increased by about 1,200 acres, from 13,200 acres to 14,425 acres. For the same time period, Sullivan County has seen minimal change in current use acreage, which held steady at 68% of the county's land area. Sullivan County has the highest proportion of its land area in current use out of all counties in the State.

Taxation rates are based on the use of the land, which is broken into five categories: forest, forest with stewardship, farmland, wetland, and unproductive land (Table 14). Forest land with documented stewardship has a lower assessment, to reflect the cost of active stewardship of the land; documentation of a Certified Tree Farm, a Forest Stewardship plan from a licensed forester, or a summary of a Forest Stewardship plan developed privately are sufficient to enroll a parcel in current use as forest land with documented stewardship.

Table 14. Current Use land in Charlestown, by category, 2007.

Current Use Type	Acreage	% of CU Land	% of Town
Forest	9,163	63.5%	40.0%
Forest with stewardship	2,122	14.7%	9.3%
Farmland	2,536	17.6%	11.1%
Wetland	92	0.6%	0.4%
Unproductive	512	2.6%	2.2%
Total in Current Use	**14,426**	**100%**	**63%**

Source: NH Department of Revenue Administration, 2008

A penalty, the Land Use Change Tax, exists for withdrawing land from current use for another purpose, but it is possible to withdraw land from current use and develop it. Therefore, current use is not considered a long-term conservation method. In Charlestown, the withdrawal of land from current use has been minimal; 186.39 acres were removed from current use in the years 2002-2007.

3.12. Conservation Lands

Conservation lands are undeveloped lands that are protected from future development by governmental ownership or conservation easement. Depending

on the type of protection, these lands may or may not be protected in perpetuity. A conservation easement is a permanent legal agreement that restricts certain land uses to protect the land's natural features; the current landowner retains ownership of the land. Publicly owned land without special protection retains its development rights, which provides no permanent protection; these lands are sometimes referred to as unofficial conservation lands. Examples of public lands that do have special protection include:

- state parks,
- state forests,
- wildlife management areas, and
- public land with conservation easements.

Conservation lands in Charlestown take many forms: they are owned by the state, the town, and by private individuals. Some are designated for public recreation, for wildlife, for forestry, or for drinking water. They range widely in size and in location. The smallest protected parcel in Charlestown is around a drinking water wellhead in North Charlestown at 0.2 acres, and the largest is Hubbard Hill State Forest at 756 acres. In total, 11% of Charlestown's land, 2,500 acres, is protected from development. Acreages reported here are based on best available data from New Hampshire GRANIT supplemented by information from Upper Valley Land Trust (Table 15).

In addition to this list, there is a new conservation easement, the Beaudry easement, which protects 5 acres and abuts Hubbard Hill State Forest; this easement is held by the Town of Charlestown.

Through the Natural Resources Conservation Service, land directly along the Connecticut River in Great Meadow and Lower Meadows is now protected by a 150-ft-wide natural vegetation buffer. It should be noted that this is a land management tool, rather than permanent land conservation.

Table 15. Conservation Lands in Charlestown, 2008

Parcel Name	Protection Type(s)	Protecting Agencies	Acreage	Funding Program
Bascom, K.R.B. & E.	Conservation Easement	NH Dept. of Agriculture	~ 34	Land Conservation Investment Program
Charlestown Town Forest	Publicly Owned	Town	18.0	
Charlestown Town Forest - Hall Pond Lot	Publicly Owned	Town	188.0	
Charlestown Town Forest - South Hemlock	Publicly Owned	Town	62.0	
Charlestown Water Dept. – Riverfront	Publicly Owned	Town	16.6	
Charlestown Water Dept. - Borough Rd.	Publicly Owned	Town	8.2	
Connecticut River State Forest	Publicly Owned	NH DRED	216.0	
Fall Mountain	Publicly Owned, Conservation Easement, Executory Interest	Nature Conservancy; NH DRED; State of NH	~520.1	Land & Community Heritage Investment Program
Francis	Conservation Easement, Deed Restriction	Town; OEP	296.4	Land Conservation Investment Program
Hubbard Hill State Forest	Publicly Owned, Deed Restriction	DRED	759.0	Land and Water Conservation Fund
North Charlestown Water Department	Publicly Owned	Town	0.2	
Soper	Conservation Easement, Executory Interest	Connecticut River Watershed Council; SPNHF	40.4	
Spaulding WMA	Publicly Owned	NH Fish and Game Dept.	56.0	
Sussman	Conservation Easement, Executory Interest, Deed Restriction	Town; NH DRED; NH OEP	41.6	Land Conservation Investment Program
Swift Farm	Conservation Easement	Upper Valley Land Trust	54.8	
Town Forest - Reservoir Lot	Publicly Owned	Town	189.0	

Source: NH GRANIT, 2008, verified by Conservation Commission

3.13. Natural Resources Cooccurrence

To identify areas with high natural resource value, the Charlestown Conservation Commission used a method known as cooccurrence analysis. This is a geographic analysis of natural resource overlap and spatial coincidence. In such an analysis, important resources are identified and their locations analyzed to yield "hot spots" showing where multiple important natural resources occur in the same location. Cooccurrence analysis is a quantitative method of determining which areas are most valuable, and therefore, can be used to help prioritize land and resource conservation.

To organize this analysis, six natural resource categories were identified by the Conservation Commission. Within each category, Commission members selected at least one mapped feature that represented the natural resource, such as riparian areas around ponds to represent the surface water resource (Table 16).

Each mapped feature was assigned a value of 1 for the cooccurrence analysis. These data were analysed using a spatial overlay algorithm in ArcGIS 9.2. This algorithm added up the number of features coincident at all locations throughout Charlestown; in other words, where features overlapped, their "1" values were added up. Therefore, the results of the cooccurence analysis are easy to interpret and explain – a spot with a score of "6" indicates that 6 resource features overlapped.

Table 16. Components of natural resources cooccurrence analysis

Natural Resource Category	How this Resource was measured
Surface Water	Ponds and land within 500-ft of a pond
	Streams and rivers (4th order and higher) and land within 500-ft of these streams
	Clay Brook, Little Sugar River, and land within 50-ft
	Wetlands
	Floodplains
Groundwater	Stratified-drift aquifers
	Wellhead protection areas
	Land in Watershed Protection Overlay District
Wildlife	Important habitat identified in Wildlife Action Plan
	Amphibian/reptile habitat – land within 500-ft of vernal pools and road crossings
	Approximate locations of rare species
Farm and Forest Land	Prime agricultural soils (federal designation)
	Actively farmed land or working/managed forests
Sand and Gravel	Soils likely to yield sand and gravel near existing pits and quarries
Open Space	Conservation land or land within ½-mile of conservation land
	Upper slopes of Sam's Hill – above 1,460-ft
	Steep slopes – slope greater than 15%

The results of the cooccurrence analysis are shown in Map 10. More than 90% of Charlestown was identified with at least one important resource feature; the highest score was 11, located near the Little Sugar River.

4. Conservation Focus Areas

From the results of the cooccurrence analysis, eight different “conservation focus areas” were identified; these are “hot spots”, or areas with clusters of high scores (Map 11). It is important to recognize that these focus areas represent the most valuable areas for multiple resources; there are other areas of town that are important for a single resource or a small number of resources.

The conservation focus areas were named after the most prominent natural or cultural feature on or near the site. From north to south, these eight focus areas are:

- North Charlestown Riverfront
- Little Sugar River
- Oxbow Wetland/Beaver Brook
- Clay Brook
- Patch Park/Fort at No.4
- Great Meadow
- Lower Meadows
- Meany’s Cove

It should be noted that all of the conservation focus areas are clustered along waterways. This is due to co-location or proximity of surface water resources, groundwater resources, agricultural uses, sand and gravel deposits, and important wildlife habitat along the Connecticut River and its major tributaries in Charlestown, namely the Little Sugar River and Clay Brook. Due to the lack of significant areas of aquifer, sand and gravel deposits, and agricultural land in the eastern sections of town, these areas are not well-represented by this focus area analysis. Their under-representation in this analysis should not be interpreted to construe that the upland forests of eastern Charlestown are not valuable; for this reason, the conservation plan that follows in Section 5 includes recommendations to better manage resources in all parts of Charlestown, not just the eight conservation focus areas.

Volunteers visited each of these conservation focus areas in May 2009 to verify the results of cooccurrence analysis and to gather more site-specific information on each of these areas. These surveys were descriptive in nature and focused on land uses, land cover types, and conservation values. In the case of Oxbow Wetland/Beaver Brook, the conservation focus area was adjusted based on the field surveys; the focus area was expanded to include a northern tributary to the oxbow wetland.

Each of the eight conservation focus areas are described in detail on the following pages. Supporting documentation from the field surveys, including maps and photographs, are located in Appendix F.

North Charlestown Riverfront -
This is a small strip of land along a bend in the Connecticut River, west of Route 12A north of Ox Brook Rd. in North Charlestown. Forested land lines the Connecticut River and the area around Ox Brook; to the east are pastures, two private homes, and the headquarters of the Student Conservation Association. There are walking trails well-maintained by the SCA in this area. Survey volunteers found a camping area with a fire pit in the wooded area.

This land is part of the river's riparian area and floodplain. The trees and vegetation on the banks of the Connecticut River help prevent erosion and stabilize the slopes, which are steep in some areas. Survey volunteers noted that Ox Brook, a tributary to the Connecticut, had some trees that had fallen into the brook and washout around trees, indicating areas of erosion. There are some wetlands in this area; a vernal pool lies along one of the trails. This area is also underlain by a stratified-drift aquifer.

Habitat types in this area include: floodplain forest, grassland, and oak-pine forest; an exemplary natural community has been documented in the general vicinity by the Natural Heritage Bureau. Common trees are white pines, beeches, and hemlocks. Survey volunteers identified ferns, princess pine (a type of club moss), and several species of spring ephemeral wildflowers, including trout lily, trillium, jack-in-the-pulpit, and Canada mayflower. Small sections of invasive species are present, including honeysuckle, bedstraw, Japanese knotweed, wild rose, and wild grape. Evidence of turkey, deer, woodpeckers, chipmunk, squirrel, and fox was apparent at the time of the survey.

Little Sugar River –
The Little Sugar River flows through the Town of Unity and through the village of North Charlestown before entering the Connecticut River. This focus area is centered on the lower reaches of the river, near the village of North Charlestown. This area was the most highly ranked in the cooccurrence analysis because a wide variety of natural resources are found near this river.

The dominant land use of this area is residential, but there are also forested lands, hayfields, and two active gravel pits. One of the larger tracts of forestland adjacent to the river was recently subdivided into five lots. A discontinued gravel excavation is being converted to high-density residential use. Public access is currently limited, partly due to the steep terrain. Unofficial trails do exist, especially between Route 12A and the railroad culvert on the north side of the river and west of Wheeler Rand Road on the south side.

The land is part of the river's riparian area and floodplain, and its floodplain forest has been given the highest ranking in the state Wildlife Action Plan. The floodplain forest contains several uncommon tree species, including sycamore and yew. Other forest types are hemlock and mixed deciduous, with hemlock being more prevalent on steep slopes near the river. The invasive species Japanese knotweed is very common throughout the area and is especially common along the river and roadways. Wetlands are limited to narrow drainage areas or oxbow/floodplain areas of the river. Steep slopes are common, and there are a few areas of exposed ledge, generally near the waterfall south of Morningside Lane.

Common wildlife in the area at the time of survey was a variety of bird species; also abundant were deer and turkey sign. The Natural Heritage Bureau has documented a rare reptile species in the area. The varied terrain, agriculture fields, forested areas, and riparian areas suggests that a wide range of species would occupy this area. It should be noted that Route 12 and the railroad corridor substantially impact the connectivity of terrestrial wildlife habitat along the river. Culverts underlying Route 12 and the railroad may inhibit the movement of aquatic organisms. In addition, invasive species are beginning to impact the ecology of the river corridor.

The Little Sugar River corridor is of special cultural importance to the community. The North Charlestown Water Department's well field and wellhead protection area are located here, and the area is underlain by aquifer. The immediate area around the North Charlestown gravel wells is protected from development, and the mouth of the river is protected by conservation easement. The prominent location of the river corridor and its proximity to the historic village of North Charlestown increases its value to the community.

Oxbow Wetland/Beaver Brook –
Between River Road and Routes 11/12 near the CEDA Industrial Park is a large shallow wetland that drains to the Connecticut River. This focus area includes this wetland, its tributaries, and immediate watershed. The wetland was formed by the natural meandering of the Connecticut River, which formed an oxbow lake that has since filled in to become a wet meadow. There is a small pond within this wetland. Incoming streams feed the wetland from the north and the south; a stream on the western side connects the wetland to the river, passing under the railroad corridor via a culvert.

The land inside and to the north of the C-shaped wetland is used for farming (corn for silage). Stream dredging and streambank clearing near the fields has occurred in the past few years. Other land around the wetland is forested. The eastern side of the wetland is mainly hemlock, the western side is aspen and cottonwood with a few white birches and elms, and the edges of the wetland host ash-leaf maple, black willow, speckled alder, and red osier dogwood. Invasive species in this area include purple loosestrife (widespread), honeysuckle (widespread), and European buckthorn (limited, near the railroad.) There is a rare plant species in the vicinity.

Common wildlife in and around the wetland include: numerous species of birds, including migrating birds in spring and fall, deer, muskrat, beaver, and many species of fish and amphibians. Mink, otter, and moose have also been seen in this area.

Public access to the northern side of the wetland is limited during the growing season by a locked gate May through October. At other times of year, the gate is open and this is a popular hunting and fishing spot; in the fall, the state stocks the fields with pheasant. There is no public access on the south side of the wetland, and the land is posted against trespassing.

Beaver Brook is the tributary on the southern end of the wetland. This brook flows through medium-density and high-density residential areas; despite this, it appears from the aerial photograph that riparian buffers remain relatively intact. The headwaters of Beaver Brook are a large wetland complex on the east side of Old Claremont Rd. This wetland is primarily a red maple swamp with some open water; the eastern side is predominately tall red maples with little understory, while the western side has more shrubs, including dogwood, serviceberry, opposite-leaf maple, and red maple. A power line cuts through one corner of the swamp. Signs of deer, bear, and beaver were seen, and ducks were heard during the field survey. This area is extremely wet, and therefore unlikely to attract public recreation. Another brook flows into the oxbow wetland from the north; beaver activity has created wetland areas along this brook.

The watershed includes CEDA Industrial Park, several manufactured housing parks, and medium-density residential development. Forested areas are interspersed between developed areas. In addition to the large wetland complexes described above, there are several small wetlands, brooks, and drainages throughout the area. There are some areas of steep slopes, but no significant erosion was noted during the field survey. This watershed area abuts wellhead land along the river owned by the Charlestown Water Department. As this area is highly developed compared to other areas in town, the wetlands and remaining forested areas are extremely valuable for flood attenuation, absorption of stormwater, and water supply protection.

Clay Brook –
The land around Clay Brook and along North Hemlock Rd. contains features from all six natural resource categories included in the cooccurrence analysis. About half of the land is cleared for farm fields or pasture, supporting a beef cattle farm and a vegetable farm. Part of this area is protected from development by the Swift Farm easement. The other half is mixed forest, much of which is protected from development for water supply protection; the land is owned by the Charlestown Water Department.

Clay Brook is one of the major tributaries to the Connecticut River in Charlestown, is part of the floodplain, and is connected to several wetlands in the area along North Hemlock Rd. Some of the wetland are heavily vegetated; some have areas of open water.

The forested area around Clay Brook is part of a very large hemlock-hardwood-pine forest community extending into surrounding towns. There are several areas of steep slopes, but no erosion along the creek was noted. The invasive species, honeysuckle and Japanese barberry, were documented in this area. A rare plant species has been documented in the vicinity of Clay Brook by the Natural Heritage Bureau. Survey volunteers noted deer tracks in the area.

Recreation opportunities in this area include hiking and snowmobiling as well as hunting and fishing.

Patch Park/Fort at No. 4 –
The Connecticut Riverfront near Patch Park and the Fort at No. 4 in Charlestown ranked high in the cooccurrence analysis for flood protection, aquifer and wellhead protection, and important habitat for wildlife. This area is entirely underlain by aquifer and the northern half falls within a wellhead protection area for the Charlestown water supply. Though cultural resources were not included in the cooccurrence analysis, this area is extremely important to Charlestown as it contains a public access point to the Connecticut River, a recreational park, and an historic site from the colonial/Revolutionary War era. The open views to the river at Patch Park also contribute to the cultural value.

The area around the Fort and Patch Park is maintained as open fields; south of the fields is a cornfield. A narrow riparian buffer grows along the river west of the Fort, dominated by sumacs, speckled alders, dogwoods, poplars, grapevines, and honeysuckle. The lower riverbank has been reinforced with riprap. Between the Fort and Patch Park are a line of red and white pines, with a few younger hardwoods. Patch Park has scattered trees, including large ash-leaf maple and cottonwood and a row of arborvitae. South of the park are huge ash-leaf maples and poplars. A small swamp with elderberry, dogwood, and honeysuckle lies in the southwest corner of the park. The cornfield has some wild shrubs growing along its edges, providing a riparian buffer. This riparian buffer includes some wet, swampy areas.

This site was ranked highly by New Hampshire Fish and Game for its open fields that provide wildlife habitat; however, the heavy recreational use of Patch Park may deter wildlife usage in the park. The Natural Heritage Bureau has documented a rare aquatic species in the vicinity. The riparian area along the River next to the fort is beneficial for wildlife and water quality protection. In addition, this area lies directly across the river from the Springfield Town Forest in Vermont, which contributes to a regional network of open space.

Great Meadow –
Great Meadow, located south of Charlestown west of Route 12, is primarily agricultural land, which is owned by TransCanada and leased to farmers. In the past several years, the management of this land and Lower Meadows has been altered to improve the value of wildlife habitat and to protect the shoreline of the Connecticut River. Most notably, in 2002, a shoreland buffer was planted by the joint efforts of TransCanada, the Sullivan County Conservation District, the Natural Resource Conservation Service, and a large number of local volunteers.

Agricultural uses of the land are for growing corn, hay, and pasture for cattle. At the southern end of Great Meadow, there are extensive marshes as well as an area of silver maple floodplain forest. The buffer zones between agricultural fields and the river have been planted with white pine, red oak, dogwoods, and silver maple; there are also naturally-occurring boxelder, poplar, sumac, alder, grasses, and herbaceous plants. Purple loosestrife is present in wet areas of the cornfield; *Galerucella* beetles were released in 2002 to control this invasive plant. Invasive species present on the southern end of Great Meadow include honeysuckle, Japanese barberry, and multiflora rose.

The riverbanks are steep and sandy, prone to chronic erosion. The buffer zones planted in 2002 have helped to lessen bank erosion, although some erosion is still evident. Cows have recently been fenced out of Dickerson Brook, which has allowed aquatic and riparian vegetation to grow back. Great Meadow is also important for protecting water quality, as it is underlain by aquifer and also lies in the floodplain of the Connecticut River.

Great Meadow is part of a regional wildlife corridor, designated as the Lower Connecticut River Important Bird Area (IBA) by the National Audubon Society– the IBA includes all lowlying land along the Connecticut River from the Massachusetts border to Springfield, Vermont, and Charlestown, New Hampshire (Appendix C.) At the time of the field survey, bobolinks, grassland sparrows, goldfinches, red-winged blackbirds, and Canada geese were present. The buffer zone is now well-established, providing shelter and food for wildlife. Great Meadow is proximate to a known amphibian crossing area. There is also a beaver lodge, reported to be active by a local fisherman, on Dickerson Brook. Fish in Dickerson Brook include bass, pickerel, northern pike, and perch. Bank swallows nest in the riverbanks. This is a popular area for birdwatching, fishing, and duck hunting.

Along the river lies a walking trail maintained by the Conservation Commission. TransCanada maintains a boat ramp and picnic area at the northern end of Great Meadow, and boats can also travel from the Connecticut River up Dickerson Brook.

Lower Meadows –
Lower Meadows is located just west of South Charlestown near the Route 12/12A jughandle on the Connecticut River. Agricultural lands cover about 80% of this area, which is almost entirely devoted to silage corn crops. The area west of Route 12 is predominately well-drained while the area to the east is poorly drained.

This area, similar to Great Meadow, has great value for flood protection and lies partially in the wellhead protection area for a community well for a mobile home park. This area is underlain by aquifer.

Wetlands are primarily located east of Route 12 and near the railroad tracks; there are also some wetlands west of Route 12 in the agricultural fields. Marshes with some open water are the predominant type of wetlands in this area. Purple loosestrife has invaded the wetlands near the Route 12/12A junction.

Natural land cover is limited to the bank of the Connecticut River and in and around wet areas and drainage ditches. Willow is the most common tree with lesser numbers of poplar, cherry, and white birch. Invasive honeysuckle is widespread in the wooded area, and rugosa rose is also present. As with Great Meadow, there is a shoreland buffer planted in 2001 by the joint efforts of TransCanada, the Sullivan County Conservation District, the Natural Resource Conservation Service, and a large number of local volunteers. From the field survey, the riparian buffer seems to have had a minimal impact on bank erosion but has served to keep fertilizer and manure away from the river. Some of the area planted in 2001 has since eroded into the river. Bank erosion is less severe at Lower Meadows than at Great Meadows due to differences in topography and upstream river management structures (i.e., rip-rap above Great Meadow, but none near Lower Meadows.)

Lower Meadows provides several types of wildlife habitat. The cornfields are important as a stopover for migrating waterfowl in the spring and fall. The wetlands east of the railroad tracks provide habitat to nesting birds. Beaver activity is noticeable on the Connecticut River banks as well as in wetlands near Old Route 12.

Lower Meadows has very limited public access during the growing season due to the agricultural nature of the area; in the fall, the cornfields are a popular site for duck hunting.

Meany's Cove –
This focus area south of South Charlestown is an embayment or backwater of the Connecticut River; it lies due west of the Fall Mountain State Forest. Once used heavily for agriculture, there are now only a few acres of field in the northern section. About 90% of Meany's Cove is a very large wetland area that provides flood protection, aquifer protection, and wildlife habitat. Roughly half of the wetland area is open water, which is heavily utilized by waterfowl both for nesting and as a migratory stopover. There were also many songbirds in the wetland at the time of the field survey. Meany's Cove is directly across the river from Herrick's Cove, one of the premier birdwatching locations in New England; this is a very important stopover for migratory waterfowl.

While a large part of Meany's Cove is open wetland, there are some forested areas, including a small area of floodplain forest. Common trees are willow, poplar, and cherry, with sumac and alder in the understory. Along Route 12 east of the wetland and just north of a cluster of houses is an upland forest with shagbark hickory, pine, and maple. The Natural Heritage Bureau has documented a rare plant species in the vicinity. Invasive honeysuckle is widespread; purple loosestrife and rugosa rose are also present. The riparian buffer along the Connecticut River is intact, but there is some erosion caused by fluctuating water levels and the cove's location on a bend in the river.

Public access to Meany's Cove is from Route 12; this is a popular fishing spot but parking is very limited. There was evidence of human disturbance and erosion around this access point. An Adopt-A-Highway program helps to clean up trash twice per year along the roadway. There may be an opportunity to improve access to this area via a trail or canoe launch from the field north of the cove.

5. A Conservation Plan for Charlestown

Based on the information gathered in the Natural Resources Inventory, the Charlestown Conservation Commission developed an action plan to promote "the proper utilization and protection of the natural resources and for the protection of watershed resources of [Charlestown]" (RSA 36-A). The Conservation Commission reviewed the Town Master Plan and other towns' natural resources inventories and conservation plans to create a prioritized listing of the work the Conservation Commission should seek to undertake to better protect natural resources.

The list was broken down into three major goals: Increasing Land Conservation, Improving Land Management, and Expanding Knowledge of Town Resources.

Increasing Land Conservation

The Conservation Commission seeks to protect the following resources via conservation easement or land acquisition:

- Forestry resources, including expanding Town Forests when possible;
- Agricultural lands, primarily through conservation easement;
- Areas of important wildlife habitat;
- Riparian lands;
- Wetlands;
- Aquifers that currently provide or have the potential to provide drinking water.

Lands with any one of these resources will be considered as important for the Conservation Commission to protect. In addition, the co-occurrence analysis identified eight focus areas where many of these important resources overlap. These areas are high priorities for land conservation and also environmentally sensitive land management.
The Conservation Commission will seek to achieve this goal of increased land conservation through the financial support of land conservation projects using the Conservation Fund and also landowner education, to be accomplished in concert with land management education efforts (see below). The Conservation Commission proposes to work towards increased land conservation on an ongoing basis, with a planned evaluation of progress in two years.

Partners for Land Conservation
The Charlestown Conservation Commission will work with partnering organizations to promote and support land conservation activities. Land trust partners include the Upper Valley Land Trust, Society for the Protection of New Hampshire Forests, The Nature Conservancy, Audubon Society of New Hampshire, and New England Forestry Foundation. The Connecticut River Joint Commissions are working to reinstate their

Partnership Grant Program, which was used in part to fund land conservation projects in the upper Connecticut River watershed.

State and federal agencies may also be involved in land conservation, often by administering grant programs. The NH Department of Environmental Services' Drinking Water Supply Protection Program administers the Water Supply Land Protection Grant Program to protect drinking water supplies. The Natural Resources Conservation Service, part of the US Department of Agriculture, administers the Farm and Ranch Lands Protection Program to protect agricultural land. US Fish and Wildlife Service manages the Silvio O. Conte National Wildlife Refuge, which seeks to protect the native plants and animals of the Connecticut River Watershed.

Improving Land Management

The Conservation Commission has identified three primary routes to promote responsible land management:

1. Manage town lands responsibly so as to be a model for private landowners

2. Provide educational resources to landowners and residents on land stewardship

3. Support the work of related groups and organizations.

The Conservation Commission proposes to focus on these activities over the next two years, after which time the membership will evaluate their progress and revisit their planning goals. The first route is to manage town lands responsibly and serve as a model to private landowners. The Commission will consider the certification for Town Forests through the American Tree Farm system and also will seek to develop management plans for all town-owned parcels of conservation land.

The second route is to provide information on land management methods that conserve natural resources. There are a variety of ways to accomplish this, and the Commission will undertake several of these outreach activities in the next two years (priority actions shown in bold):

- **Provide educational materials on forestry best management practices to forestland owners, potentially when landowners file Intent to Cut forms.**
- **Educate landowners regarding issues such as the importance of vegetated buffers and the impacts of improper use of fertilizers.**
- **Educate landowners about the importance of protecting and enhancing migratory and resident wildlife habitat, by providing workshops and/or displaying wildlife maps, handouts, and publications in the Town offices and library**.
- **Educate the public on invasive species so that the control of these plants can be done at the landowner level along with other property maintenance.**

- Educate residents about the benefits of and need to preserve groundwater resources, potentially through fact sheets/flyers sent with water and sewer bills.

  Partners for Outreach
  Regional and state agencies and organizations as well as other town Conservation Commissions are likely partners for the Conservation Commission in delivering outreach on natural resources conservation and protection. The County Conservation District, UNH Cooperative Extension, and the Upper Valley Lake Sunapee Regional Planning Commission are involved in public education and outreach. In addition, staff from state agencies are often involved in public outreach on current "hot" topics, in particular NH Department of Environmental Services (on shoreland protection) and NH Department of Agriculture (on invasive species). Multi-town events, organized by Conservation Commissions in adjacent towns, are one option to attract a wider audience.

  State agencies and non-profit organizations may also have outreach materials available for distribution, or may have funding available to help with educational campaigns.

The third route is to support and coordinate activities with other conservation organizations to accomplish mutually beneficial work. Some examples of partnership opportunities include (priority actions shown in bold):

- **Provide the Natural Resources Inventory to the Planning Board for use in development application review and policy development;**
- **Support the Tree Committee's work to maintain and care for street trees;**
- **Work with other towns or the Upper Valley Lake Sunapee Regional Planning Commission to investigate options for household hazardous waste collections;**
- Work with the Mt. Ascutney subcommittee of the Connecticut River Joint Commissions on water protection efforts, including road salt reduction initiatives;
- Work with the Planning Board to discuss designation of Scenic Roads, per RSA 231:157, to protect the trees and stone walls of scenic road corridors;
- Support the continuation of the Current Use tax assessment program.

Expanding Knowledge of Town Resources

The Natural Resources Inventory represents the first comprehensive, town-wide index of natural resources in Charlestown. The inventory focused on resources that have already been mapped or studied by state or federal agencies, although the Conservation Commission and town residents did undertake some data collection and field surveys. There are opportunities for further study to obtain more site-specific information about local natural resources.

The Conservation Commission has identified three priority areas (in bold) and a fourth additional area where more information must be gathered in order to develop a plan to adequately protect the Town's resources:

- **Inventory of parcels of unfragmented land, particularly those abutting conservation land, waterbodies, or wildlife habitat and travel corridors;**
- **Prioritization of land parcels with important cultural, historical, and recreational value, in addition to their ecological value;**
- **Inventory and mapping of vernal pools;**
- Inventory of scenic views and vistas, particularly those at risk of being lost and those along the Connecticut River Byway.

Work on information-gathering projects will progress as time and funding allows, with progress evaluation after two years.