2009

Town of Barrington Natural Resources Inventory: A Reference

PREP

Town of Barrington, New Hampshire

Natural Resources Inventory: A Reference

Prepared for:
Barrington Conservation Commission

by:
Strafford Regional Planning Commission

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1.0 INTRODUCTION

1.1 Purpose [1]

What is a natural resources inventory (NRI)?

- A LIST: Broadly defined, a natural resources inventory lists and describes important naturally occurring resources within a given locality.

- A PLANNING TOOL: A natural resources inventory seeks to identify and, if possible, prioritize the most important lands in an area or town that should be considered when land use change is proposed or when conservation planning occurs.

- A DOCUMENT TO HELP ADDRESS GROWTH: A natural resources inventory helps to focus attention on, and address the challenges to environmental and recreational needs of a community in the face of rapidly expanding population and its associated development.

How is a natural resources inventory used?

- Describes natural resources with data, maps and photographs

  A natural resources inventory helps provide a clear picture of where resources are located and why they are significant. A primary goal of a natural resources inventory is to provide visual images such as maps and photographs, data tables, and descriptions to gain a clear understanding and appreciation of the community's natural resources.

- Obtains public input about locally significant natural resources

  A natural resources inventory can be used to help determine preferences and opinions of residents with regard to identifying the most important natural resources in the town. A natural resources inventory is a public document, developed using a public process and made available for review and comment by the public.

- Establishes community priorities

  A natural resources inventory can be used to help the community determine priorities for community and regional land protection activities, expenditures of public funds, promotion of conservation easements, development of Master Plan and other planning documents, inform decisions of land use boards, enable application for grant funds, and support natural resource planning efforts on a regional basis.

[1] This section draws on the narrative in pages 1-3 of *Natural Resources Inventories – A Guide for New Hampshire Communities and Conservation Groups* (2001), UNH Cooperative Extension; and in pages 3-5 of *An Inventory of Natural Resources for the Town of Barrington* (2001), Barrington Natural Heritage Committee.

- Opens a dialogue with landowners about conservation

  A natural resources inventory can be used to start a dialogue with landowners and all residents about land use options, land stewardship, and conservation of natural resources.

- Forms a foundation for proactive work groups

  A natural resources inventory can inspire the creation of work groups to raise awareness of important resource based issues, conduct research to address data or knowledge gaps, and guide them in developing policies and priorities for land use and land conservation.

- Raises the level of knowledge and awareness

  A natural resources inventory can educate the public and motivate individuals, civic groups, and local officials to consider the various benefits of protection and conservation of natural resources. A natural resources inventory can identify lands that contain key natural resources vital to community enrichment, health and enjoyment - lands that support industries such as tourism, farming and forestry; lands that provide opportunities for recreation; and lands that protect the history, character and identity of the community.

- Provides data for planning, regulation, and Master Plan

  A natural resources inventory can assist the community in achieving its planning and regulatory responsibilities and goals of the Board of Selectmen, Planning Board, Conservation Commission, and Recreation Department. The document can be incorporated into the Master Plan to help legally establish and support the town's goals and actions with regard to future land and resource uses and regulation.

- Provides data for land conservation planning

  A natural resources inventory provides data and analyses regarding natural and historical resources than can inform and support land conservation planning efforts now and into the future.

1.2 Background

In 2001, the Barrington Natural Heritage Committee (NHC), a volunteer committee created by the Board of Selectmen and reporting to the Conservation Commission, developed Barrington's first natural resources inventory. Using a set of maps produced in the 1990's by the Strafford Regional Planning Commission and the personal knowledge of committee members, the NHC created an overview of important natural resources within the town.

The NHC developed a set of criteria to identify important natural resources that were not already publicly owned or protected by a conservation easement. The criteria were grouped under the following major categories: natural resource type, recreational potential, historic significance,

location, and special considerations such as local importance or unique manmade features. These criteria were applied across a four-sector geographic grid of the town, with each grid evaluated by a subcommittee. Collectively, the NHC examined the findings to identify 44 locations containing priority natural, historic, scenic, or recreational values.

The 2001 Natural Resources Inventory was used to help the Town preserve several environmentally valuable parcels of land. However, by 2008, the inventory and maps had become obsolete. The Town applied for, and received a grant from the New Hampshire Estuaries Project to update and supplement the first-hand knowledge of the Town's important resources that created the original inventory, by incorporating more detailed Geographic Information Systems (GIS) based data and a revised Map Set.

A Natural Resources Inventory (NRI) working group was formed with representatives from the Town's Natural Heritage Committee, Conservation Commission, Recreation Commission, Planning Board, and Select Board. This group is tasked with guiding development of this revised inventory, and evaluating potential uses for lands to help prioritize them for protection of their natural resources – forests, farmlands, wetlands, surface waters, aquifers, wildlife habitat, and unique natural features – through voluntary land conservation, planning initiatives, and regulatory measures.

1.3 Natural Resources Inventory Goals

This updated inventory will allow the Town to better address, at a more integrated level:

- Making connections among and between already conserved parcels in order to form wildlife corridors and greenways.
- Protecting watersheds that are important both as drinking water supplies to the Town and downstream communities, as well as to the health of Great Bay.
- Enhancing and increasing opportunities for recreational use of open space.

1.4 Natural Resources Inventory Objectives

This updated inventory will be used to:

- Identify high priority areas for conservation that can be targeted for protection.
- Provide direction for future conservation projects. Since these often involve substantial expense and the Town's resources are limited, it will also be useful in grant applications for land protection assistance from state and federal governments, and from private agencies.

- Incorporate comprehensive natural resource conservation provisions into Town regulations, such as the Town's Master Plan, subdivision regulations, and zoning ordinances.

1.5 Natural Resources Inventory Approach and Organization

This revised Natural Resources Inventory is based on the methodology in *Natural Resources Inventories – A Guide for New Hampshire Communities and Conservation Groups* by the University of New Hampshire Cooperative Extension.

The following sections of this document describe the types, values, and potential threats to the different natural resources found in Barrington. GIS-based data and maps related to each resource are presented and ongoing planning efforts, where applicable, are discussed. Finally, recommendations for additional planning activities and/or protection measures are listed to support future efforts. Summary data and graphics are presented throughout the document, while detailed data tables are included in Appendix A and in the accompanying Map Set.

1.6 Recommendations

Review and update this Natural Resources Inventory every three to five years as the Town's priorities change and new information becomes available.

DISCLAIMER:

The data presented in this inventory came from a variety of source and obtained using a variety of different analytical or estimated methods. As a result, the data should be used for planning purposes only. If greater data precision is required, this inventory should be supplemented with field surveys or other on-the-ground methods of data collection.

There may also be minor data discrepancies throughout this document due to the variety of source materials and mapping standards used. The reader is encouraged to refer to the original referenced sources if specific data inconsistencies need to be resolved.

2.0 LAND USE AND ZONING

Barrington is fortunate to be largely undeveloped, providing the Town with a large stock of natural areas, abundant natural resources, and valuable habitats. As illustrated on the aerial photograph Map 1 (Base Map), on Map 2 (Land Use), and in the table below, undeveloped lands comprise nearly 70 percent of the Town's total area. Conserved and protected lands comprise 3,462 acres of this amount, or 11 percent of the Town's total area.

The Town has approximately 14 percent of land devoted to developed uses including residential, commercial, institutional, utilities and transportation. Undeveloped lands account for 69 percent, and water and wetlands account for the remaining 16 percent of the Town's total area. More detailed breakdowns of land use and land cover are found in Table 1 of Appendix A.

Table 2-1: Summary of Land Uses in Barrington

General Land Use Category	Acreage	% of Total Town Area
Residential	3,540.0	11.37
Business, Commercial, Industrial (inc. sand/gravel operations)	196.7	0.63
Government, Municipal, Institutional, Recreation, and Cemeteries	185.6	0.60
Utilities	223.5	0.72
Transportation Related	323.5	1.04
Undeveloped Lands - disturbed/barren/vacant, agriculture, forest, streams, lakes, wetlands	21,527	69.18
Water, Wetlands	5,120.8	16.46
Total Town Area	**31,117.3**	**100.0**

[Source: Strafford Metropolitan Planning Organization Database, April 2007]

2.1 Zoning Districts

One of the most effective methods to protect natural resources is through local zoning ordinances and land use regulations. The Town of Barrington has a comprehensive zoning approach that supports protection of a variety of natural resources. The town is divided into five Base Zoning Districts – general residential, neighborhood residential, village district, regional commercial, and the new town center district. All lands within the municipal boundaries of the town are located within one of these five districts as identified on the Official Zoning Map.

The Barrington Master Plan also contains Conservation Subdivision regulations that support the Town's strategic objectives to set aside open space, protect key natural resource features, preserve wildlife habitat, and create recreation opportunities for residents. These regulations encourage the preservation of open space by promoting greater flexibility in the design of

residential subdivisions than would otherwise be possible under conventional subdivision practice. All proposals for development of a Conservation Subdivision are evaluated against objectives related to maintaining the town's rural character, preserving environmentally sensitive features and large land blocks, preserving scenic views, and reducing impacts from development. To date, three conservation subdivisions have been approved and built. One has 18 house lots with 41 acres in conservation easement held by the Town. Another has about 25 house lots with 93 acres in an easement held by the Strafford Rivers Conservancy. The third development is 50 house lots on approximately 100 acres, with the disposition of the open space yet to be finalized.

In addition to the Base Districts and Conservation Subdivision regulations, there are a series of overlay zoning districts. These overlay districts may or may not occur within all parts of the town. They are intended to regulate the use of specific features or characteristics of the community. These districts are:

- Wetlands Protection District Overlay
- Shoreland Protection District Overlay
- Floodplain Management District Overlay
- Groundwater Protection District Overlay
- Wireless Communications Facilities Overlay
- Highway Commercial District Overlay

2.2 Environmental Constraints

Natural resources that are regulated by local ordinances or regulations are considered "constrained lands" or areas that are not appropriate for development due to sensitive resources; and where regulations exist that restrict or regulate development. Constrained lands also include lands within specified setbacks and buffers to these resources.

Barrington's regulated resources include the Isinglass River, other year-round streams, ponds greater than two acres, wetlands including prime wetlands and vernal pools, 100-year floodplains, and aquifers. The zoning ordinance creates buffers and setbacks from wetlands and shorelands; and mandates stormwater management and protection for storage of substances in aquifer zones. An excerpt of Barrington's zoning ordinances related to natural resource protection is included in Appendix B.

At the state level, the New Hampshire Department of Environmental Services (DES) regulates impacts to wetlands, and wetlands permitting along with shorefront development under the New Hampshire Shoreland Protection Act (RSA 483-B). Section 9.0 discusses wetlands in greater detail and Section 7.6 provides more detail on lands subject to the Comprehensive Shoreland Protection Act requirements.

2.3 Recommendations

2-1 Finalize the amended Zoning Ordinance and Zoning Map, and update the Town's Land Use webpage with the most current zoning documents (The March Town Meeting 2008 version of the zoning ordinance is on the Planning Board webpage, but the map is not on the website at all).

2-2 Update the Town's subdivision regulations relating to conservation subdivisions in order to better reflect the primacy of conservation values to the Town.

3.0 PHYSIOGRAPHY

3.1 Topography

Topography is an important factor in the assessment of suitability of development or resource protection. Areas of relatively high relief are a visual asset and as such, are vulnerable to potentially unsightly development.

As illustrated on Map 3 (Topography) Barrington has generally flat to moderately sloping landscapes, dominated by low hills and the floodplains of the Isinglass River and its tributaries, and numerous lakes and ponds. The highest elevations in town include:

- Bumfagging Hill (600 feet)
- Nippo Hill (580 feet)
- Mt. Misery (570 feet)
- Sunnyside Hill (520 feet)
- Huckleberry Hill (500 feet)
- Green Hill (390 feet)
- Peaked Hill (385 feet)
- Beauty Hill (360 feet)
- Berry's Hill (320 feet)

Visual Resources

Many hillsides, ridgelines and other open spaces provide aesthetic value, important for the preservation of an area's natural beauty, historical context, and character. Development and site disturbances in these areas can cause permanent adverse impacts on scenic value, especially on hillsides and ridgelines that are visible from public roads and facilities. NH DES, in its *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* recommends conducting an inventory of visual resources and developing land use overlays for protection of important viewsheds to minimize impacts on these resources.[2] A technology called Viewshed Analysis has been used by some state and federal agencies for studying the visual implications of siting structures like telecommunication towers.

Steep Slopes

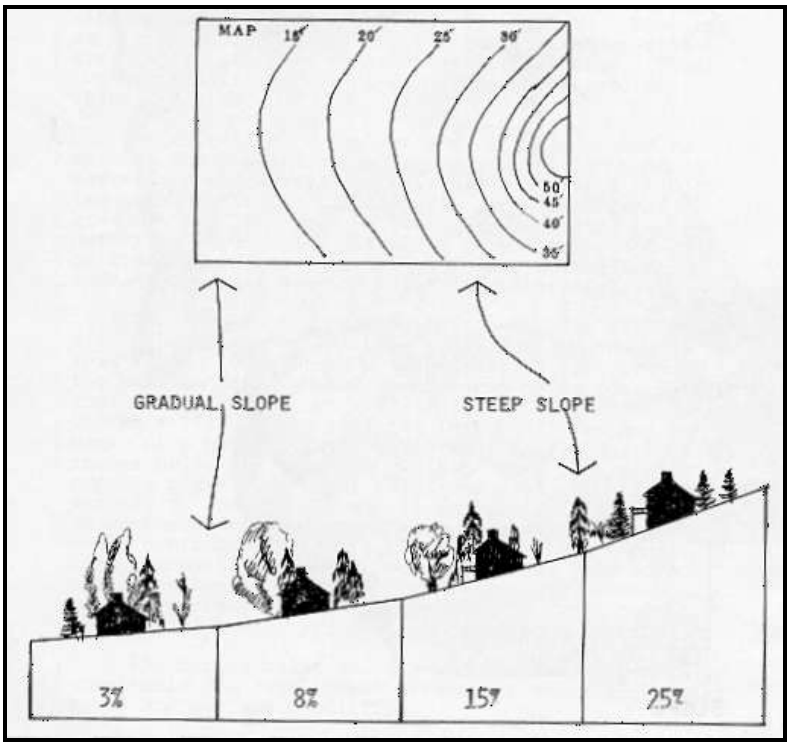
Slope is a significant factor in an environmental inventory and may severely limit certain types of land use. Generally, as slope increases, service and development costs increase. Therefore, the steeper the slope, the more unsuitable development becomes. Land use limitations based entirely on slope begin when the slope is between 12 and 15 percent and generally grow more restrictive as slope increases.

During construction, removal of the soil humus layer, or addition of impervious surfaces can cause excess surface runoff on moderate or steep slopes, thereby leading to erosion and stream

[2] *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* (2008) NH Department of Environmental Services, Section 2.2.

pollution through increased sedimentation. Thus, slopes over 25 percent should remain naturally vegetated as part of an open space system. Where construction occurs on moderate slopes, proper erosion and sediment controls should be required.

Figure 3-1: Slope Diagram



[Source: *Natural Resources Inventory* (1998) Strafford Regional Planning Commission]

As shown in Map 3 (Topography), slopes of 15 percent and greater are scattered throughout the Town, with the steep slopes often associated with the edges of glacially created lakes and ponds. Slopes greater than 15 percent comprise approximately 2,430 acres or 7.8 percent of Barrington's total area.

Table 3-1: Barrington's Slopes

Percent Slope		
Percent Slope	Acres*	**%Town Area**
0-5%	18,884.9	60.7
5.1-10%	8,327.6	26.8
10.1-15%	2,744.8	8.8
15.1-25%	1,038.7	3.3
>25%	113.8	0.4

[Source: USGS Digital Elevation Model (30 meter resolution)]
*Note- Acreage calculations are estimates only

Barrington's Conservation Subdivision regulations currently prohibit residential development in Conservation Subdivision areas with slopes greater than 25 percent; and limit development to 75

percent of areas with slopes between 15 and 25 percent. The table below describes appropriate developed land uses for varying slope categories. This information may be useful as a reference for evaluating proposed development projects.

Table 3-2: Suggested Developed Land Uses Based on Slope

Slope	Suggested Developed Land Uses
0-3%	Flat lands are suitable for most large industrial and commercial buildings. Roads, highways, and active recreation uses such as ball fields, and agriculture are also suitable for these flat areas. Very flat sites may pose such problems as (1) inadequate drainage especially during peak storms and (2) inadequate gravity flow for sanitary sewers.
3-8%	These gently undulating areas are suitable for single-family housing on small and medium lots, apartment buildings, secondary roads, as well as most of the activities above, with increasing limitations at the upper extreme of the category.
8-15%	Development costs and the potential for runoff and erosion begin to increase. These areas are suitable for single family housing on large lots, townhouses, and garden apartments.
15-25%	Townhouses with multi-level entrances, using the cluster technique, can be considered in these areas. The cost of development becomes a major factor. Runoff erosion control is essential.
> 25%	Almost all development should be prevented. Development costs and potential environmental impact are high. Such factors as shallowness to bedrock soils, drainage problems, runoff, and erosion severely limit construction on these slopes.

[Source: *Natural Resources Inventory*. (1998) Strafford Regional Planning Commission]

3.2 Geology

Bedrock Geology

There are two major bedrock types found in Barrington - those derived from ancient sediments that were re-crystallized to form metamorphic rock; and those that formed from molten magma, called igneous rock. Most of the metamorphic formations are made up of varying amounts of schist, quartzite and slate, which were originally clays, sands, and sand-clay mixtures. These formations developed from sediments laid down in a shallow inland ancient sea that covered much of New England approximately 350 million years ago. In general, the metamorphic rock is the oldest, some having been formed between 430 and 520 million years ago. Igneous rocks, primarily granite, are somewhat younger (360 - 410 million years old) and were formed by intruding the existing metamorphic or meta-sedimentary rock.

Bedrock outcrops can be observed in several locations in Barrington. An excellent example is at Stonehouse Pond. Bedrock outcrops provide aesthetic as well as educational resources, and are excellent places to view the composition and formation of the landscape.

Figure 3-2: Stonehouse Pond Outcropping

[Source: John Wallace]

Surficial Geology

Most of the materials found at the surface of the landscape in New Hampshire are the products of continental glaciations that occurred during the Pleistocene Epoch. As the ice receded from this area around 10,000 to 15,000 years ago, it left a variety of deposits. The last glacier was a solid mass of ice about one mile thick. As it moved over the earth's surface, it scoured and smoothed the underlying bedrock, and picked up soil, rock and other debris along the way. As the ice sheet advanced and its front melted, it deposited a layer of unsorted debris (till). As the glacier began to melt and retreat northward, debris freed from the ice sheet was transported, sorted, and deposited, forming sands and gravels. As the ice sheet continued to retreat, a tremendous quantity of water from the glacier made its way to the sea. The glacier left a land area that had been depressed by the weight of the ice sheet. Consequently, sea level rose in relation to the land, partially flooding the present coastal area of the state. The maximum submergence was about fifteen to twenty miles inland, or approximately to New Hampshire Route 125. [3]

The depositional environments[4] of glaciers, lakes, and streams are characterized by sediments exhibiting a wide variety of grain sizes, grain shapes, and sorting. Sediments in a glaciated terrain typically encompass the entire range of grain size from microscopic particles of clay to large, house-size boulders. This entire range is present in the Town of Barrington as it is throughout the state.

Modern-day streams deposit silt, sand, and gravel (including pebbles) in flood plains as well as in the streambeds. This is known as alluvium. Larger size particles such as cobbles and boulders,

[3] *Natural Resources inventory* (1998) Strafford Regional Planning Commission.
[4] This discussion taken from *Surficial Geologic Map of the Town of Barrington, Strafford County, New Hampshire – Summary* (2009) Dr. Ernst H. Kastning, NH Geologic Survey, NH Department of Environmental Services.

are also commonly found in the beds of streams. During the Pleistocene, streams and lakes associated with glaciers and their melt water produced deposits of sand and gravel, found near ancient and modern-day shores. The material itself is the source for sand and gravel used in construction and associated activities. Extensive sand and gravel deposits that are moderately to well-sorted, have a high level of porosity and permeability, form stratified aquifers that can store and provide large quantities of groundwater, such as the large stratified drift aquifer in the north and east sections of Barrington. Refer to Section 8.0 and Map 8 (Water Resources).

Some depositional environments such as swamps, marshes, and offshore areas of lakes produce fine-grained sediment where particles are smaller than sand. These include a high proportion of silt and clay. Most fine-grained materials (silt and clay) in Barrington are found in glacial till, which covers most of the Town. Till typically includes a very poorly sorted mix of all grain sizes (clay particles up to large boulders). From a resource perspective, till may provide clay and boulders for use in activities ranging from ceramics to building of stonewalls. Till generally makes for a poor aquifer that yields little or no water due to very low porosity and permeability.

3.3 Recommendations

3-1 Expand Zoning Ordinances to restrict steep slope development on non-residential sites.

3-2 Seek municipal official training in Visual Resource Analysis, conduct visual resources inventory and evaluate if additional zoning regulations are warranted.
See http://www.blm.gov/nstc/VRM/vrmsys.html

4.0 SOIL RESOURCES

4.1 Overview

Soil is the unconsolidated mineral and organic matter on the immediate surface of the earth that serves as a natural medium for the growth of plants. Understanding the nature and properties of soils is critical to managing and conserving natural resources. Different soil types developed from the interaction of several natural phenomena, including vegetation, topography, erosion, climate, and surficial geology.

The US Department of Agriculture's Natural Resources Conservation Service (NRCS) studies and inventories soil resources across the country. Soil surveys contain detailed soils maps, data tables, and text narratives that assist in determining 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 most recently published edition of the Strafford County Soil Survey dates back to 1973. The smallest soil area that can be shown on the county soil survey is three acres in extent. The data and soils map for this inventory were derived from the 1973 survey.

Soil Classification

Soil classes are based on a soil's capability to produce commonly cultivated crops and pasture plants without deteriorating over a long period. Soil morphology (distinguishing characteristics such as color, texture, structure, parent material, depth and configuration, permeability, erodibility, saturation, vegetation) and characteristics that develop during soil formation (e.g. chemical weathering due to climate, actions of living organisms, and parent material) collectively determine soil class. These units are further sorted based on land capability such as farmland, wetland, and forest soils. Soil classifications are designed to guide choices in land use and soil management.

Soil Drainage Characteristics

Soil drainage characteristics are based on a soil's permeability - the ability of air and water to move through it. Permeability is influenced by the size, shape, and continuity of pore spaces, which is dependent on soil density, structure, and texture. Texture is one of the most important characteristics since it influences many other properties of soil such as irrigation needs, erosion potential, and fertility. Soil texture describes the proportionate distribution of different sizes of mineral particles in a soil, excluding organic matter.

Generally, sandy soils tend to be low in organic matter content and fertility; low in ability to retain moisture and nutrients; and well-drained and therefore well suited for road foundations and building sites. Finer-textured soils are generally more fertile; contain more organic matter; and are better able to retain moisture and nutrients. When soils are so fine-textured as to be classified as clay they are somewhat difficult to manage for cultivation, and have characteristics that adversely affect their suitability at building sites and for road construction.

4.2 Farmland Soils and Agriculture

Soil productivity is a key factor in the economic value and ecological diversity of New Hampshire's landscape. However, the best farmland soils are largely unprotected in all regions of the state.[5] NRCS defines three main classifications of farmland soils.[6]

Prime Farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when the land is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources and causes the least damage to the environment.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has acceptable acidity or alkalinity. It has few or no rocks, and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods, and either does not flood frequently or is protected from flooding. The slopes on prime farmlands range mainly from zero to 8 percent. The land may currently be in crops, pasture, or woodland; but not urbanized, built-up land or water areas. It must either be used for producing food or fiber, or be available for these uses.

Farmland of Statewide Importance is land, in addition to prime and other unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. The state government designates farmland of statewide importance with the concurrence of the NRCS State Conservationist. Generally, these farmlands include those areas that are nearly prime farmland and that can economically produce high yields of crops when treated and managed according to acceptable farming methods.

Farmland of Local Importance includes certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops. These lands are designated by local agencies with the concurrence of the NRCS State Conservationist, and may include tracts of land that have been designated for agriculture uses by local ordinance.

As can be seen on Map 4 (Agricultural Resources), important farmland soils are scattered throughout Barrington, many in small parcels. The largest areas of farmland soils are in the northern and eastern corners of Town. The table below shows that farmland soils comprise over 14 percent of the Town's total area. Of these farmland soils, more than 83 percent or over 3,600 acres lie within 150 feet of a road. This factor can increase the vulnerability of these areas and their potential loss to future development.

[5] *New Hampshire's Changing Landscape - Population Growth and Land Use Changes: What they Mean for the Granite State (2005),* Society for Protection of New Hampshire Forests.
[6] USDA NRCS Agriculture and Food Act of 1981 (PL 97-98), Farmland Protection Policy Act (FPPA).

Table 4-1: Barrington's Farmland Soil Resources

Area	Acres	% Total Town Area
Prime Farmland Soil	953.3	3.1
Farmland of Statewide Importance	742.9	2.4
Farmland of Local Importance	2,695.6	8.7
Total Farmland Soils	**4,391.8**	**14.2**

[Source: NRCS Strafford County Soil Survey 1973]

Current agricultural land use in Barrington comprises less than 700 acres, only 16 percent of total farmland soils, and just over 2 percent of the Town's total area. This may indicate that agricultural resources are not being fully utilized, and that these lands are vulnerable to permanent loss by development. With their good soil properties and generally level grades, farmlands are easily developable lands. However, when developed, these areas are forever lost to fragmentation, filling and pavement.

Table 4-2: Active Farms in Barrington

Name	Location	Products/Goods
Warren Farm	30 Warren Road	Fruits, vegetables, flowers, holiday trees
Sallie Fen's Alpacas	97 Swain Road	Yarn, hand knit clothing
Yellow House Farm	541 Route 202	Chickens, ducks, geese, turkeys, guinea fowl; vegetables and flowers
Nippo Brook Farm	628 Mount Misery Road	Vegetables
Something to Crow About	509 Route 9	Eggs, chickens and fowl
Profile Alpacas	345 Dairy Hill Road	Yarn
Lasting Legacy Farm	148 Second Crown Point Road	Beef, pork, chicken , turkey and lamb
Boody Farm	Canaan Back Road	Hay
Union Lake Orchard	Young Road	Peach orchard

[Source: Barrington Farmers Group]

Protection of Farmlands and Agriculture

Local farmlands provide historic and aesthetic values. Their open space, along with farmhouses, barns and stonewalls are part of the town's historic rural character. Open agricultural fields also provide habitat for a variety of wildlife including many bird species and small mammals (see Section 6.4). Loss or fragmentation of the relatively small amount of non-forested open land would be detrimental to these species.

Agriculture[7] includes all aspects of breeding, raising, and selling livestock; silviculture (timber and logging); honey and maple syrup production; crops ranging from vegetables and fruit to hay and seeds; and activities related to the processing, storage, and transportation of agricultural products. With almost 96 percent of New Hampshire farms classified as "small farms" by the US Department of Agriculture's definition of sales below $250,000, farmers' greatest asset is their land. When farms are profitable, farmers are able to keep their farms and woodlands undeveloped. If a farmer goes out of business or sells their land to move to an area with less development pressure, the community is affected by the potential conversion of the land.

Many community master plans cite "preserving rural character" as one of the main goals. There are many aspects to rural character in New England. The character of the landscape is epitomized by the traditional village center surrounded by a landscape of working farms and open space. Although many people enjoy farmland for its open spaces or the fresh vegetables available at the farm stand, farming is fundamentally a business enterprise. One unique aspect of agriculture is that it does not fall neatly into a prescribed area of a community like a traditional commercial or industrial zone. Instead, productive farms are located where the physical characteristics of the land, such as prime soils and adequate water supply occur, regardless of the zone. Wherever farms are located, communities need to consider carefully both the benefits of, and challenges to sustaining agriculture.

Often, a coordinated package of financial incentives and land use regulations are more effective than a single approach to farmland preservation. Several techniques have been employed in successful preservation approaches including: transfer or purchase of development rights through conservation easements, current use tax assessments, right-to-farm laws, agricultural zoning and protections, and boundaries on urban growth districts.

4.3 Forest Soils [8]

While the concept of "prime farmland" is familiar in agricultural and land conservation circles, a similar concept focusing on forest soil productivity and management limitations has been developed in New Hampshire by the NRCS. The terrain features, topography, and soils that provide the foundation for today's forests can be traced to the grinding, scraping, and dumping action of glacial ice or to the action of melt water as the last glacier retreated northward. As a result, there is considerable variability in soil types across the state and across a given site. Most variability in tree species and forest composition is due to differences in underlying soil type, available nutrients, and moisture.

[7] This discussion taken from *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* (2008) NH Department of Environmental Services, Section 1.7.

[8] This discussion taken from *New Hampshire's Vanishing Forests: Conversion, Fragmentation and Parcelization of Forests in the Granite State - Report of the New Hampshire Forest Land Base Study*, pp 25-26. Sarah Thorne and Dan Sundquist, Society for the Protection of New Hampshire Forests. Concord, New Hampshire. April, 2001.

Much of the best forest soils are found in the southeastern part of the state - in the lower Merrimack River Valley, the Seacoast area, and along the Route 16 corridor – the most rapidly urbanizing counties of the state, and the most threatened by growth and development.[9]

Soils mapped by the NRCS for each county soil survey have been grouped into six forest-related categories, termed "Important Forest Soils Groups" based on the inter-relationship between soil characteristics including texture and moisture or wetness; inherent limitations of the soil for forest management e.g. steep slopes, shallowness, boulders, rock outcrops; and typical forest successional trends on certain soil types.

Important Forest Soil Groups

Group 1A forest soils include deeper, loamy soils, moderately- to well-drained, and are considered prime northern hardwood forest soils, also applicable to hemlock growth for certain soil series. In Barrington, these soils account for nearly 5,500 acres or about 17 percent of the Town's total area.

Group 1B consists of sandy or loamy soils that are moderately- to well-drained. These soils are good for growing paper birch, beech, and oak (northern mixed hardwood forest type). This is the predominant soils group in Barrington with over 13,000 acres or 42 percent of the Town's total area.

Group 1C soils consist of outwash sands & gravels, and support the growth of white pine. These soils constitute about 2,800 acres or 9 percent of the Town's total area.

Group 2A soils are Groups 1A and 1B soils with site limitations (e.g., very steep, shallow, or rocky) that limit accessibility and forest management activities. In Barrington, these areas comprise another 9 percent of the Town's total area.

Group 2B soils are very poorly-drained soils (Hydric A), often associated with wetlands, and in Barrington, very poorly drained soils account for over 8 percent of the Town's total area.

Other soils included in Group NC (not classified) are muck and peat soils, rock outcrops, gravel pits, marshes, and those soil types not considered productive for forest management. This category also includes poorly drained soils (Hydric B).

As dramatically illustrated on Map 1 (Base Map), Barrington is mostly forested, covering nearly two-thirds of the Town's total area. Therefore, forests and woodlands constitute a very important natural resource. Data on important forest soils is included in Table 2 in Appendix A and Map 5 (Significant Soils) illustrates these important forest soil types, which are discussed in detail in Sections 5.0 and 11.0.

[9] *New Hampshire's Changing Landscape - Population Growth and Land Use Changes: What they Mean for the Granite State (2005),* Society for Protection of New Hampshire Forests.

4.4 Sand and Gravel

Sand and gravel are valued resources for road construction and maintenance. However, areas containing sand and gravel are also important groundwater recharge areas for stratified drift aquifers. As described in Section 3.2, the surficial geology of Barrington suggests the availability of significant sand and gravel resources associated with stratified drift aquifers. Land use data for the Town identifies approximately 55 acres currently designated as mining (see Table 1 in Appendix A) and over 2,800 acres of land are classified in Table 2 in Appendix A as Forest Soils Group IC - outwash sand and gravels.

Abandoned gravel pits provide habitat for rare or threatened species including Blanding's turtle and the Northern black racer snake. Kim Tuttle, Wildlife Biologist with NH Fish & Game Department has indicated that all of her observations of Blanding's turtle nesting sites have been at abandoned gravel pits in various stages of natural succession. These pits are often located near good turtle habitat including marshes, shrub swamps, slow-moving streams, vernal pools, and in areas of limited human disturbance. However, reclamation of abandoned gravel pits that typically involves the addition of soils or other materials could be detrimental to these species.[10]

Topsoil is not needed on most gravel pit surfaces in order to establish warm season grasses, but may be appropriate where cobbles or clean gravel are exposed. The addition of topsoil is expensive, and carries its own set of environmental concerns including removal from its original location and transportation to the reclamation site[11]. Therefore, the town should carefully consider the potential trade offs for preservation of nesting areas for sensitive species between allowing abandoned gravel pits to re-vegetate naturally, and traditional active reclamation activities.

4.5 Recommendations

4-1 Ensure that new development proposals are evaluated for potential impacts to important farmland and forest soils.

4-2 Develop incentives to encourage active agricultural activities, and to protect farmlands not currently in use.

4-3 Reuse sand and gravel excavation sites as habitat restoration and low-impact, non motorized recreation.

4-4 Consider creating a new zoning district for rural, agriculture, and forest lands.

[10] Email communication 08/13/08.
[11] *Concerns Using Topsoil in Gravel Pit Reclamation factsheet.* (1995) USDA NRCS. ftp://ftp-fc.sc.egov.usda.gov/NH/Conserv_Tips%26Fact_Sheets/Concerns%20using%20Topsoil%20in%20Reclamation.pdf

5.0 FORESTS AND WOODLANDS

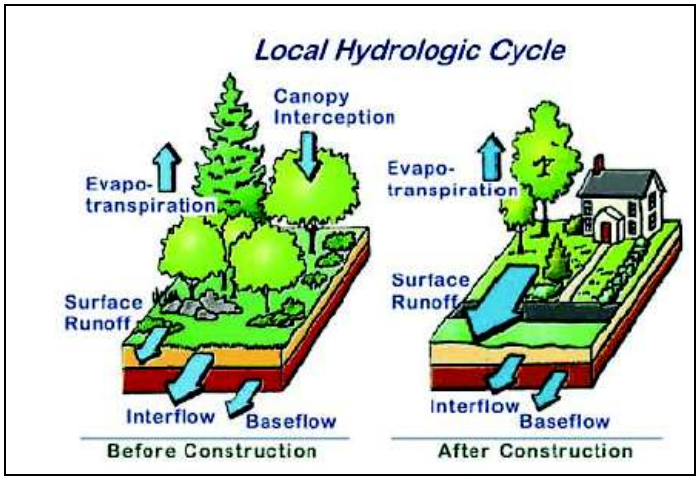
5.1 Overview

Forests in New Hampshire are usually composed of multiple species and several forest types. Forest types are distinctive communities of trees, shrubs, and herbaceous plants. They are named for the predominant tree species occurring in the community. A forest type may be naturally dominated by a single tree species (called a monoculture as often seen in pine forests) or it may be dominated by several species growing together to form a complete vertical forest structure or any combination of canopy, understory and groundcover. Occasionally plantations of trees occur in NH, but they usually have a specific purpose (e.g., Christmas tree farm) and are not fully functioning forest ecosystems.

Forests and woodlands provide significant resources and values. Firewood and wood products, wildlife habitat, scenic beauty, stabilization of land, removal of pollutants, maintenance of stream quality and habitat, and air quality and temperature enhancement and stabilization are all benefits that forests provide. Forests and woodlands also encourage recreational opportunities through scenic trails for hiking, walking, biking, and horseback riding; hunting grounds for bird and game species; and a natural laboratory for botanists, bird watchers and scientific research. Forest and woodland buffers along roads and between properties provide important aesthetic benefits such as visual screening, and contribute to reduced noise and air pollution from developed areas and roads.

Many social, health, and ecological benefits are provided by forests and woodlands, both locally and regionally. Forests and trees process rainwater through absorption and evapo-transpiration; reduce carbon dioxide in the atmosphere; increase groundwater infiltration and improve surface water quality by removing pollutants and nutrients from runoff; and serve as buffers to protect wetlands from sedimentation and contamination.

Figure 5-1: Role of Trees in Managing Stormwater Runoff



[Source: Maryland Department of Natural Resources, Urban & Community Forestry Program]

Trees provide two stormwater management functions: by leaves and branches intercepting and absorbing some rainfall; and by reducing the size and velocity of intercepted raindrops before they reach the ground. Trees and forested areas near surface waterbodies, homes, roads and developed areas serve to cool summer temperatures, break winter winds, and filter dust and pollutants from the air. As urban areas expand and populations move outward to less developed areas, the effects of forest loss take on greater importance.

5.2 Forest and Woodland Resources

Throughout the NH seacoast region, forested lands are decreasing due to increased population and development pressures. Statewide, forest cover is predicted to decline from about 87 percent of the state's land area in 1987 to 80 percent by 2020. The greatest loss of forested land is expected to occur in southeastern New Hampshire, with about 60,000 acres lost in Rockingham, Hillsborough, and Strafford Counties, where 85 percent of the population growth from 1998 to 2020 is expected to occur.[12]

According to the land use statistics in Table 1 in Appendix A, Barrington's forested lands comprise 66 percent of the Town's total area - over 20,000 acres of mixed hardwood, deciduous and coniferous forest. The table below suggests even greater forest coverage with over 23,000 acres (these data were compiled from satellite imagery at a scale suitable for the entire state, and may therefore overestimate local-scale forest land cover). Many of the town's forested areas have grown from abandoned agricultural land and clear-cut areas that have regenerated and matured over the last half century. Most of Barrington's forests are classified as mixed forest.

Table 5-1: Barrington's Forested Land Cover

Forest Type	Acres	% Total Town Area
Mixed Forest	14755.9	47.4
Beech/Oak	2981.7	10.4
Other Hardwoods	2671.6	8.6
White/Red Pine	2447.4	7.9
Forested Wetland	537.6	1.7
Other	281.7	< 1
Total	**23675.9**	**76.1**

[Source: New Hampshire Land Cover Assessment Final Report (2002). Complex Systems Research Center, UNH]

Many large blocks of forestland are still intact. Eight large unfragmented areas totaling over 12,000 acres have been identified by the NH Wildlife Action Plan as Contiguous Forest Blocks

[12] *New Hampshire's Changing Landscape - Population Growth, Land Use Conversion, and Resource Fragmentation in the Granite State* (October 1999), Prepared by: Dan Sundquist, The Society for the Protection of New Hampshire Forests and Michael Stevens, The New Hampshire Chapter of The Nature Conservancy. http://www.spnhf.org/research/papers/NHCLsummary.pdf

as shown on Map 6 (Unfragmented Forest Blocks). A detailed discussion of habitats associated with different forest types, and the importance of unfragmented forest lands is provided in Section 11.0.

NH Tree Farm Program

As the oldest and most successful forest conservation program in the country, the American Tree Farm System encourages private forest owners to actively manage their forests in a sustainable manner to achieve multiple resource values. These privately owned forests are managed to produce timber, with additional benefits such as improved wildlife habitat, water quality, recreation, and scenic value. By actively managing their forests, landowners can earn income from their land, thereby relieving the economic pressure of development while preserving open space. This contributes to the rural character of the town. Publicly owned lands such as municipal watersheds and school forests can also become Tree Farms. To qualify as a Tree Farm, landowners must:

- Dedicate a least 10 acres to growing and harvesting forest products;
- Develop a stewardship plan for the future management of their forest;
- Follow management recommendations prescribed by a licensed forester;
- Demonstrate a commitment to stewardship of their forest for multiple values; and
- Meet the certification standards established by the NH Tree Farm Performance Rating System.[13]

All qualified Tree Farms display the Tree Farm sign to notify the passing public that the green countryside they pass by is a managed forest. There are 26 tree farms comprising a total of 3,103 acres in Barrington.

NH Big Tree Program

Large mature trees provide more cooling shade and more places for wildlife to perch and nest, trap more pollutants, and purify more water than small trees. Although many tree species can outlive humans - 100 to 200 years is not unusual – trees naturally succumb to age, disease and insects, and environmental disturbances such as wind, flood, and drought. Increasingly, these trees are being lost to development.

In an effort to find, record, and recognize individual landmark specimen trees, the New Hampshire Big Tree Program was started in 1950, and works cooperatively with the American Forests' National Register of Big Trees. Community Tree Steward volunteers help identify, measure, and record these giant trees at the state, county and national levels. This program publishes a list of the biggest trees of each species throughout the state (available at http://extension.unh.edu/forestry/BigTree.htm). The list reports information about the largest specimen of each species including: height, circumference, average crown diameter, year of measurement, location by city and county, and health status. The actual location of individual trees is not published to protect the integrity of the resource. As detailed in Table 3 in Appendix

[13] University of New Hampshire Cooperative Extension, Forests & Trees, NH Tree Farm Program website http://extension.unh.edu/Forestry/TreeFarm.htm

A, there are five listed State Champions and six County Champion Big Trees identified in Barrington.

The Society for the Protection of New Hampshire Forests

The Forest Society (SPNHF) has been a leader in the state in supporting and shaping the sustainable forestry certification programs including administration of the New Hampshire Tree Farm program, Forest Stewardship Council, and the Sustainable Forestry Initiative. SPNHF works to preserve and protect valuable forest tracts throughout the state, and holds conservation easements on two properties in Barrington – the 1,378-acre Tamposi (SATWaSR) property and the 64-acre Jeffery property.

5.3 Recommendations

5-1 Consider adding minimum tree coverage/canopy requirements to commercial and village district zoning.

5-2 Encourage volunteer and school-based efforts to identify NH big trees.

5-3 Work with Tree Farm property owners on public outreach and education about this valuable resource – not many people understand what a tree farm is, and its value.

5-4 Celebrate Arbor Day in Barrington.

5-5 Train and hire a land steward for SATWaSR land in conjunction with SPNHF, and for other town-owned lands and town-held easements.

6.0 PLANTS AND ANIMALS

6.1 Rare, Threatened and Endangered Species

In 1987, the New Hampshire legislature passed the Native Plant Protection Act (RSA 217-A) which formally recognized that *"for human needs and enjoyment, the interests of science, and the economy of our 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."*

Through this legislation, The New Hampshire Natural Heritage Bureau (NHB) Inventory locates, tracks and disseminates information about the state's biodiversity. The NHB maintains a database of known rare plant and wildlife populations, and exemplary natural communities throughout the state. The rare wildlife occurrences are maintained in conjunction with NH Fish & Game Department's (F&G) Nongame and Endangered Wildlife Program, which has legal jurisdiction over these species. NHB uses a five-point scale (1= critically impaired, 5 = common) to indicate the relative rarity of each species, at both a state and global level of occurrence. NHB also maintains data on the relative quality of rare species populations and natural community occurrences, all of which are considered to be of high conservation value.[14]

The NH F&G Nongame and Endangered Wildlife Program is the steward for the state's nongame wildlife species (not hunted, fished or trapped). Through wildlife monitoring and management, outreach, and education. The Nongame Program works to protect over 400 species of mammals, birds, reptiles, and amphibians, as well as thousands of insects and other invertebrates. "Endangered wildlife" includes those native species whose prospects for survival in New Hampshire are in danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance, or contamination. Assistance is needed to ensure continued existence as a viable component of the state's wildlife community. "Threatened wildlife" are those species that may become endangered if conditions surrounding them begin, or continue, to decline.[15]

Table 4 in Appendix A lists rare plant and animal species and exemplary natural communities found in and around Barrington, including 5 plant communities, 14 plants species, 3 reptile species, 2 bird species, 3 fish species, and 1 mammal. The Land Conservation Plan for New Hampshire's Coastal Watersheds also identified several small areas in the town with rare plants, exemplary communities and/or their supporting habitats.[16] Refer also to Section 11.4, Tables 12 and 13 in Appendix A and Map 7 (Areas of Ecological Significance) for more detail.

NH Fish and Game's Matthew Carpenter indicates that the state-endangered Brook Lamprey has been found in the Oyster River, and the state-threatened Bridled Shiner has been found in the Isinglass River. In addition native Brook Trout can be found in Bumford Brook and Mallego

[14] *Natural Resources Inventories – A Guide for New Hampshire Communities and Conservation Groups* (2001). UNH Cooperative Extension. p. 27.
[15] NH Fish & Game website http://wildlife.state.nh.us/Wildlife/nongame_and_endangered_wildlife.htm
[16] *Land Conservation Plan for New Hampshire's Coastal Watersheds* (2007). Figure III-5.

Brooks.[17] NH Fish and Game is participating in the Eastern Brook Trout Joint Venture, a unique partnership between state and federal agencies, regional and local governments, businesses, conservation organizations, academia, scientific societies, and private citizens. It is a geographically focused, locally driven, and scientifically based effort to assess, protect, restore and enhance aquatic habitat throughout the range of the Eastern brook trout.

6.2 Native and Beneficial Plant Species

New Hampshire's existing native plant communities have developed and evolved since the end of the last ice age, adapting to variations in climate and natural succession. Native plants form the structure of natural landscapes - the canopy, understory, and groundcover of forests; riparian areas adjacent to rivers and streams; and open meadows.

Native plant communities provide vital and specific habitat for wildlife that depend on them for food and shelter. It is important to note that certain types of native plants thrive when planted or maintained in their natural landscapes. The table below lists native plants commonly found in different habitat and environmental settings. It is not a comprehensive listing, but is included here for illustrative purposes.

Table 6-1: Native and Beneficial Plant Species by Habitat and Environmental Conditions

Habitat-Environmental Conditions	Native Plants
Dry Sites	Pitch Pine, Native Lupine, Bayberry, Butterfly-weed, Stiff Aster, Red Pine, Scrub Oak, Lowbush Blueberry, Bracken Fern, Sweetfern, Little Bluestem, Switch Grass, Big Bluestem, Wild Rye
Moist Sites	White Pine, Beech, Red Oak, Hemlock, White Ash, Sugar Maple, Yellow Birch, Flowering Dogwood, Sassafras, Basswood, Solomon's Seal, Black Cherry, Elderberry, Wood Fern, Wild Yellow Lilly, Virgin's-bower, Highbush Blueberry, Bee-Balm, Columbine, Jewelweed
Wet Sites	Jack-in-the-pulpit, Cardinal Flower, Prairie Cordgrass, Ostrich Fern, Rushes, Sedges, Red Osier Dogwood, Silky Dogwood, Turtlehead, Balsam Fir, Red Spruce, Red Maple, Hemlock, Northern Arrowwood, Winterberry, Atlantic White Cedar, New England Aster, Blue Flag Iris, Sweet Flag
Streambanks and Shorelands	Willow, Silver Maple, Speckled Alder, Smooth Alder, Sycamore, Monkey Flower, Switch Grass, Pussy Willow
Shallow Ponds	Bur-reed, Buttonbush, Pondweed, Sedges, Rushes, Duck Potato, Fragrant Water Lily, Yellow Water Lilly, Pickerelweed, Wild Rice, Duck Weed

[Source: U.S. Department of Agriculture, New Hampshire Natural Resources Conservation Service]

[17] Personal Communication 02/19/09.

Native plants have several advantages over introduced species, including seasonal hardiness, resistance to pests (fewer chemical treatments), and low maintenance needs (less water and fertilizer). These advantages are due to the adaptation by native plants to local climate and environmental conditions. For these reasons, native plants are often easier and less costly to care for; reduce potential sources of water pollution; and reduce potential negative effects of pesticides and insecticides on wildlife and humans.

6.3 Invasive and Exotic Species

Terrestrial Invasives

An invasive or exotic species[18] is a plant, insect, and/or fungal species that is not naturally present in a particular region and has the ability to thrive and spread aggressively outside its natural habitat or climatic range. Invasive species pose a threat to native species and ecosystems in several ways. Typically, invasive species possess traits that give them an advantage over many native species. These include production of many offspring, early and rapid development, easy and rapid spread, adaptability, tolerance to a broad range of environmental conditions, resistance to disease, and absence of natural controls to keep them in check (e.g. competition, predators). These traits allow invasive species to be highly competitive and, under certain conditions, to suppress or completely replace native species. Invasive species therefore reduce natural diversity, crowd out endangered or threatened species, reduce wildlife habitat, and stress or reduce forest and agricultural crop production.

In 2000, the State of New Hampshire enacted legislation (House Bill 1258-FN) which required the state to conduct research and educational activities to address the effects of invasive species upon the state, and to publish annual lists of species that present potential or immediate danger to environmental and economic values. From this legislation, the New Hampshire Invasive Species Committee was formed with representatives from the Department of Agriculture, Department of Environmental Services, Department of Resources and Economic Development), Department of Transportation, NH Fish & Game, the University of New Hampshire, The Nature Conservancy, the horticultural community, and the general public. The Committee is a volunteer group that considers and evaluates the adverse environmental and economic effects of invasive terrestrial plants, insects, and fungal species upon the state.[19]

The list of Prohibited Species includes 35 invasive plants and 16 insect species deemed to present an immediate danger to the health of native species, to the environment, to commercial agricultural or forest crop production, or to human health. These species are prohibited from sale, transport, distribution, propagation, or transplantation in the state. A list of Restricted Plant Species is also published annually. It includes species that present the potential for environmental or economic harm, but such potential may be reduced or eliminated by cultural or biological practices. These species exhibit invasive tendencies, but do not meet all the criteria to

[18] This discussion from NH Department of Agriculture, Division of Plant Industry, http://agriculture.nh.gov/divisions/plant_industry/documents/Webpage_introduction.pdf
[19] Final Version HB 1258-FN.

be listed as Prohibited. The NH Department of Agriculture also publishes a list of prohibited invasive insect species that pose a threat to the state. A fact sheet and detailed invasive plant, tree, and insect species lists are available at http://agriculture.nh.gov/divisions/plant_industry/documents/Webpage_introduction.pdf

A partnership among several state and federal agencies and conservation groups was recently formed to coordinate regional invasive plant management, and to protect the ecological integrity of natural habitats and the economic vitality of managed lands. The New Hampshire Coastal Watershed Invasive Plant Partnership's (CWIPP) goals include detection, control and prevention of invasive species; restoration of native species; assessment and monitoring; collaboration; and outreach to educate and assist landowners in protection of their lands. [20]

Aquatic Invasives

The Prohibited Species List also includes 14 aquatic species that are regulated by the Department of Environmental Service's Aquatics Program. As of 2007, there were 72 documented infestations of exotic aquatic species in New Hampshire's lakes and rivers.[21] Exotic aquatic species such as variable milfoil, fanwort, water chestnut, purple loosestrife, and common reed are blanketing waterbodies throughout the state. Infestations of these plants lead to diminished wildlife habitat, decreased recreational potential, and lowered property values. Eradication of these exotics is rarely possible. For any invasive species, the best available strategies are prevention and early detection. Some of these plants can grow up to an inch a day. If new infestations are caught early, low-tech methods like hand pulling can keep them under control and prevent a whole-lake infestation.

The DES has taken a proactive approach to aquatic invasive plant control through its volunteer Weed Watcher program. Many New Hampshire lake residents, lake associations, anglers, and water recreationists take part in this program. Active monitoring programs are in place at Swains Lake, North River Lake, and Ayers Lake.

Fortunately, no occurrences of exotic aquatic species have been documented in surveys of Barrington's lakes and ponds. It should be noted however, that many terrestrial and some wetland invasive species are observable along roadsides and in wet spots in Barrington.

Japanese Knotweed is seen along Route 202. Purple Loosestrife is seen along Scruton Pond Road and Route 125, and along Route 4 near Lee. Glossy buckthorn, an invasive shrub occurs in the understory in many forested locations. Autumn Olive, Multi Flora Rose, and Sheep Sorrel are also problematic in Barrington. Oriental Bittersweet can be seen near the Isinglass River upstream of Route 126 and Route 202 intersection; and Japanese Barberry is found along Route 9 near the Wallace conservation land. [22]

[20] CWIPP Program Brochure at http://des.nh.gov/organization/divisions/water/wmb/coastal/cwipp/
[21] *The Sustainability of New Hampshire's Surface Waters*. Lakes Management Advisory Committee and the Rivers Management Advisory Committee. January 2008.
[22] R. Eckert, personal communication 03/05/09; J. Wallace personal communication 02/24/09.

6.4 Locally Observed Species

No comprehensive inventory of wildlife and plant species has been completed in Barrington. However, a wide variety of plant and animals species have been observed and documented by different groups and individuals, including the surveys conducted by the NH Natural Heritage Program described in Section 6.1. Limited terrestrial species inventories have been conducted by UNH, other entities, and individuals at the SATWaSR reserve and the abutting Warren Farm; as well as along short sections of the Isinglass River. Species lists are included in Tables 5 and 6 in Appendix A. Bobcat tracks have been observed at the edge of the Warren Farm and SATWaSR during part of a 2008 research project concerning wildlife habitat/corridor use between forest and farm. [23] The rare banded sunfish was observed in a pool in a floodplain of the Isinglass River in 2002. [24]

It is well known that some of the wetlands within the SATWaSR reserve contain rare communities of Atlantic white cedar and black gum. Scott Young, local photographer and naturalist, conducted animal surveys at Warren Farm. He observed a Blackgum/White Cedar Swamp and a deep emergent marsh, the aftermath of a 1700's bog iron mine. The farm also has quite a few Snoeshoe hare.[25] Scott has posted an impressive array of photographs of observed species in and around Barrington at http://www.flickr.com/photos/sa_young/sets/.

The NH Fish & Game Department has developed the NH Reptile and Amphibian Reporting Program (RAARP) to encourage volunteer submittals of local reptile and amphibian observations, as well as documentation of vernal pools that are important habitats for these species (see also Section 9.2). The program provides reporting forms and species and pool identification resources at http://www.wildlife.state.nh.us/Wildlife/Nongame/reptiles_amphibians.htm.

Aquatic plant inventories have also been conducted by DES at the major lakes and ponds in Barrington. This information was incorporated into lake trophic surveys discussed in Section 7.4. The reader is cautioned that some of these aquatic surveys were conducted more than ten years ago and may not reflect current conditions.

6.5 Recommendations

6-1 Develop a comprehensive program for inventory of locally observed species, including invasive species on town-owned and conserved lands. Consolidate existing data on species from sources such as UNH's work at the Tamposi land, the Land Conservation Plan, NH F&G, Barrington Trails Committee, NH Natural Heritage Program, NH Audubon, etc.

[23] Matt Moore, at http://mattsmaeeadventure.blogspot.com/
[24] Bob Eckert, personal communication 03/05/09.
[25] Personal communication 01/30/09.

6-2 Encourage schools, students and volunteers to participate in the NH Fish &Game Reptile and Amphibian Reporting Program (RAARP).

6-3 Provide educational information to educate landowners about planting native species and controlling invasive species.

6-3 Organize volunteer groups to remove invasive species from roadsides and town-owned lands.

6-4 Provide educational information for boat ramps, property owners, and fishermen about aquatic invasives (e.g., Weed Watcher and Lake Host programs) on waterbodies without these programs in place.

7.0 SURFACE WATER RESOURCES

Located in the southeastern portion of New Hampshire's Lakes Region, Barrington has an abundance of water resources, including nearly 3,700 acres of wetlands, 86 miles of rivers and streams, 1,284 acres of lakes and ponds, and important groundwater aquifer resources. This Section discusses surface water resources - watersheds, rivers and streams, lakes and ponds, and associated shoreland and riparian areas. Sections 8.0 through 10.0 describe groundwater resources, wetlands, and threats to all water resources, respectively.

Table 7-1: Barrington's Surface Water Resources

Surface Waters	Acreage	% Total Town Area
Lakes	1,199.7	3.9
Ponds	84.3	0.3
Rivers	89.8	0.3
Total	**1,373.8**	**4.41**

[Source: National Hydrography Dataset, November 2006]

7.1 Watersheds

A watershed is the area of land where all of the water that is on, over or under it drains off into the same place. A watershed acts as a funnel, collecting all water within a drainage area and channeling it into groundwater, a stream, river or lake, and ultimately into the ocean. Watersheds are land features that can be identified by tracing a line along the highest elevations between two areas on a map, often along a ridgeline.[26] Watersheds generally consist of three main elements – a stream channel, a floodplain, and the surrounding upland area. Every piece of land is part of a watershed, therefore everything that occurs on the land eventually has an effect on the water flowing through that watershed.

Barrington's major watersheds include portions of the Isinglass River watershed (a sub-watershed of the Cocheco River watershed), the Bellamy River and Oyster River watersheds (part of the Great Bay drainage area), and a small portion of the Lamprey River watershed. Each of these is made up of yet smaller sub-watersheds. Table 7 in Appendix A and Map 8 (Water Resources) illustrate the spatial extent of Barrington's different watersheds. The Bellamy sub-watershed is the largest, followed by the Lower Isinglass, and the Nippo Brook – Isinglass sub-watershed together comprising nearly 22,000 acres or 70 percent of the Town's total area.

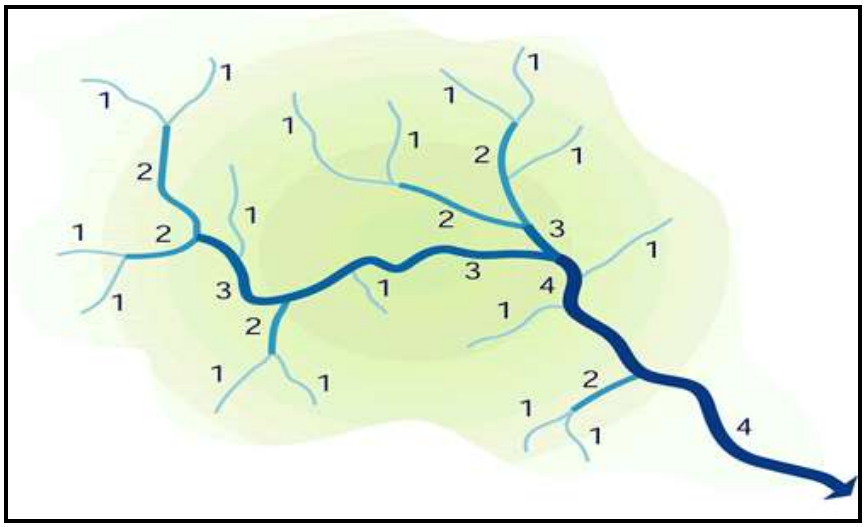
7.2 Rivers and Streams

Stream Order is a simple method to classify rivers and streams. The State of New Hampshire uses the Strahler method. Streams that have no branches are designated as first-order streams.

[26] The Community Stormwater Project, City of Columbia Missouri at http://www.gocolumbiamo.com/PublicWorks/StormWater/Watersheds/index.php

When two first-order streams come together, they form a larger, second-order stream. When two second-order streams come together, they form a larger, third-order stream, and so on. Streams of lower order joining a higher order stream do not change the order of the higher stream. Thus, if a first-order stream joins a second-order stream, it remains a second-order stream. It is not until a second-order stream combines with another second-order stream that it becomes a third-order stream.[27] Fourth order and higher streams are protected under the NH Comprehensive Shoreland Protection Act discussed below.

Figure 7-1: Strahler Stream Order Designation



[Source State University of New York College of Environmental Science and Forestry. Fluvial Geomorphology Training Module, Section 4.viii http://www.fgmorph.com/fg_4_8.php]

Headwater Streams (first-order streams) that have a watershed area less than one square mile are considered "primary" headwater streams, and can be ephemeral, intermittent or perennial. The health of larger streams, rivers, and other surface waters downstream in a watershed depend in part upon an intact primary headwater stream network. Headwater streams are particularly important for maintaining water quality due to the sheer number of miles they represent in most watershed drainage systems. In Barrington, headwater streams (primary and non-primary) account for 58 percent of total stream miles, quite a large percentage. These areas contain especially important natural resources and provide important habitat, which are vulnerable to degradation by forestry practices and land use changes.

The importance and benefits provided by primary headwater streams include reduction of sediment delivery downstream, reduction in nutrient loading (nitrogen and phosphorous), flood storage and control, wildlife habitat corridors, and aquatic habitat. There are economic benefits to protecting and improving primary headwater streams as well, including protection of public drinking water sources; maintenance of recreational uses of lakes, ponds and rivers; minimizing damage to infrastructure (bridges, culverts, dams) and property; and maintaining channel morphology and land stability.

[27]Wikipedia - Strahler Stream Order http://en.wikipedia.org/wiki/Strahler_Stream_Order

Table 7-2: Barrington's River and Stream Resources

Stream Order/Type	Miles	% Total Stream Miles
1st Order (headwaters)	45.0	58.0
2nd Order	20.5	26.5
3rd Order	9.8	12.6
4th Order	11.2	14.5
Total	**77.6**	--
Perennial	55.5	71.6
Intermittent	22.0	28.4

[Source: National Hydrography Dataset, November 2006]

The Isinglass River

In Barrington, the Isinglass River has been recognized in every community survey of valuable assets, most particularly Barrington's contribution to the State's "Cornerstones Project" in the *Regional Environmental Planning Report*, and in Barrington's Natural Heritage Committee's *Special Places*. The Town's Master Plan makes specific reference to the significance of the Isinglass River and zoning regulations singled out the River by specifying a 100-foot setback for all structures.

The Town acquired two parcels of land on the Isinglass River – Locke Falls, and the Kids of the River land - to protect them from development and provide public access along riparian areas and to the River. Just upstream from the Barrington town line in Strafford, the 286-acre Isinglass River Conservation Reserve includes more than 7,800 feet of frontage along the Isinglass River. The property was purchased in 2008 with funding from grants, in-kind land donations and easements, and Strafford's Conservation Fund. The property is now owned by the Town of Strafford with a conservation easement held by Bear-Paw Regional Greenways.

NH Rivers Management and Protection Program

In 2002, the Isinglass River was also designated by the NH State Legislature as a protected river under RSA 483 - New Hampshire Rivers Management and Protection Program. This designation grants the Isinglass River special consideration as a valuable natural resource in local development decisions within one-quarter mile of the river corridor. The Isinglass River is one of only fifteen rivers in the state currently protected in this manner. After designation, a River Management Plan was developed so that the outstanding qualities of the river can be protected for future generations. The plan was developed by Strafford Regional Planning Commission for the Isinglass River Local Advisory Committee (IRLAC) and is currently being implemented (see Section 14.1). The management plan identifies goals and actions to be taken to protect the River's resources.

Of more direct importance to the Town's planning efforts, this designation now includes the entire Isinglass River within the NH Comprehensive Shoreland Protection Act (CSPA) limiting land use, alteration, and development within 250 of the river edge. Section 7.6 discusses the requirements of the CSPA for the Isinglass River and other waterbodies in Barrington.

Instream Flow

Instream flow protection under the NH Rivers Management and Protection Program is required along designated protected rivers (or segments of them) in order to maintain water for instream public uses and to protect the resources for which the river or river segment is designated. Instream flow rules are currently being applied in a pilot program to two designated protected rivers (Lamprey and Souhegan). If this pilot program is successful, the rules would be amended before they could be applied to other state designated rivers, at which time instream flow rules could apply to the Isinglass River.

A U.S. Geological Survey Gage Station on the Isinglass River near its confluence with the Cocheco River, is part of a 2-year multipurpose streamflow monitoring network expansion project for 15 new stream gages across New Hampshire. The expansion project was requested by the New Hampshire Rivers Management Advisory Committee (RMAC), proposed by the Stream Gage Task Force (SGTF), and funding for installation was provided by the New Hampshire Legislature. The station is operated in cooperation with the New Hampshire Department of Environmental Services. As dramatically illustrated in the table below, the springtime flood events of 2006 and 2007 resulted in extremely high peak discharges.

Table 7-3: Annual Average and Peak Discharges of the Isinglass River

Year	Annual Average Discharge (cfs)	Annual Peak Discharge (cfs)
2003	not reported	862
2004	140	1,740
2005	158	1,780
2006	239	4,370
2007	not reported	6,160

[Source: USGS Water Data http://waterdata.usgs.gov/nh/nwis/uv/?site_no=01072870&PARAmeter_cd=00065,00060]

Oyster and Bellamy Rivers

The Oyster River Watershed Association is currently seeking to nominate the Oyster River as a protected river under the NH Rivers Management and Protection Program. If accepted into this program, the Oyster River would become subject to the protective considerations described above for the Isinglass River. As discussed in Section 7.7, the Oyster and Bellamy River headwaters are located in Barrington and are protected as a drinking water source protection reserve. As discussed in Sections 7.4 and 14.1, the Oyster River Watershed Association and the Bellamy Oyster River Watershed Protection Partnership are actively involved in efforts to protect and preserve these watersheds and river corridors through outreach, education, partnerships and water quality monitoring programs.

Lamprey River Watershed

Barrington is home to a small portion of the Lamprey River watershed, including parts of the Bean River sub-watershed encompassing North River Lake, and the Little River sub-watershed encompassing Mendums Pond. Map 8 (Water Resources) displays these sub-watersheds. The Lamprey River is protected under the NH Rivers and Protection Program, but that designation does not extend into the watershed in Barrington.

Fisheries

New Hampshire Fish & Game Department (F&G) reports a diverse range of fish habitats in the Isinglass River. The free flowing nature, an extensive riparian buffer, high water quality, and varied substrate types of the Isinglass River are the primary factors that account for the diverse habitats within the river. Although the Isinglass River is naturally a warm water fishery, the river is managed as a put-and-take coldwater fishery that provides habitat for approximately 20 resident warm and coldwater fish species. Naturally occurring game species include Small and Largemouth Bass. Naturally occurring non-game fishes include common species such as Bluegill, Common Shiner, Fall Fish, Brown Bullhead, and Common Sucker.

An uncommon non-game species, the state-threatened Bridled Shiner, is found in the Isinglass River and has very limited distribution in New Hampshire. Introduced game species include Brook, Brown, and Rainbow Trout. The river is stocked annually with these trout species. Much of this stocking occurs between Routes 126 and 202, one of the most popular fishing spots along the river.

Stonehouse Pond, Nippo Brook and Mallego Brook are also annually stocked by NH F&G. As discussed in Section 6.1, the Brook Lamprey, a non-parasitic relative of the Sea Lamprey, has been reported in the Oyster River; and native Brook Trout have been reported in Bumford and Mallego Brooks.

7.3 Lakes and Ponds

Lakes, ponds, and reservoirs are key elements of aquatic ecosystems, and provide valuable habitat for fish, wildlife, and plants, as well as important recreational opportunities including swimming, boating, and fishing. Natural lakes and artificially impounded reservoirs are also sources of drinking water for some local and regional users. Development adjacent to lakes and ponds poses significant potential for degradation of water quality and habitat.

Barrington is home to numerous lakes and ponds. Table 8 in Appendix A lists the state-designated public water (waterbodies over 10 acres) lakes and ponds located in town, including the highly-used Swains Lake, Mendums Pond, and Ayers Pond. Collectively these lakes and ponds amount to nearly 1,300 acres or approximately 4 percent of the town's area. Many of these lakes provide valuable recreational opportunities as described in Section 12.2.

Several lakes associations and/or volunteer lake groups are active in Barrington on Nippo Lake, Mendums Pond, North River Lake, and Swains Lake. These groups are discussed in Section 14.1. Water quality monitoring on these lakes and ponds is discussed in Section 7.4 below.

Artificial Impoundments

According to the DES Dam Safety Bureau, there are 37 registered dam structures located in Barrington, 23 of which are active. Some are quite small and include farm ponds and fire protection ponds. Dams provide impoundment for flood control, water-based recreation including boating and swimming, water supplies for drinking and fire protection, as well as wildlife habitat. A complete listing of dams including data on acreage impounded, dam height and width, hazard class, and ownership is provided in Table 9 in Appendix A. Across the state, many small, inactive dams have been targeted for potential removal in an effort to minimize the potential for dam failure and/or to restore riverine habitat.

Dams at Ayers Pond, North River Lake and Nippo Lake are operated by DES. Lake level drawdowns are conducted at these dams for purposes that may include protection of the shoreline from the erosion effects of high water, control of aquatic weeds near the shore, reducing the adverse effects of winter ice on the shoreline and shorefront structures, and providing water storage capacity to mitigate flooding.[28]

NH Lakes Management and Protection Program

In 1990, the NH Legislature enacted the New Hampshire Lakes Management and Protection Program. According to RSA 483-A, *"it is the intent of the legislature that the New Hampshire Lakes Management and Protection Program shall complement and reinforce existing state and federal water quality laws. It is also the intent of the legislature that, through said program, the scenic beauty and recreational potential of lakes shall be maintained or enhanced, that wildlife habitat shall be protected, that opportunity for public enjoyment of lakes uses be ensured, and that littoral interests shall be respected."*[29]

The program has published *Guidelines for Coordinated Lake Management and Shoreland Protection Plans* for municipalities, citizen's groups, and lake associations to use in the development and implementation of lake management and watershed management plans. Lake management describes the art of balancing the multiple uses of lakes and ponds, and their associated tributaries, while attempting to restore or protect the natural, physical, chemical, and biological characteristics within a hydrographically defined geographic area. Unique and complicated demands are placed on lakes and ponds requiring a balance of human activities to protect, preserve, and if necessary, restore environmental quality.[30] A key part of lake management is conducting a lake inventory. DES has published a Comprehensive Lake

[28] DES Factsheet WD-DB-16 *Why Lake Drawdowns Are Conducted* at http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-16.pdf
[29] RSA 483-A.
[30] *The New Hampshire Guidelines for Coordinated Lake Management and Shoreland Protection Plans and The New Hampshire Comprehensive Lake Inventory* (July 2008) NH Department of Environmental Services at http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/nhdes-wd-08-8.pdf

Inventory designed to assist users in collecting important information about a specific lake and watershed that is used to develop a lake management plan and protection strategies.

7.4 Surface Water Quality Monitoring

Monitoring Programs in Barrington

- The Isinglass River Local Advisory Committee (IRLAC) and community volunteers participate in the NH Volunteer River Assessment Program (VRAP). Within the town of Barrington, three sites on the Isinglass River and nine tributary sites are monitored for pH, turbidity, temperature, dissolved oxygen, and conductivity utilizing field meters donated by Waste Management Inc. In addition, *Escherichia coli (E. coli)* and total phosphorus samples are periodically collected on the Isinglass mainstem. IRLAC volunteers also conduct visual stream assessments along targeted segments of streams throughout the Isinglass watershed.

- The Bellamy and Oyster River Watershed Protection Partnership (BORWPP) also monitors for pH, turbidity, temperature, dissolved oxygen, conductivity, *Escherichia coli (E. coli)* and chloride at two sites along the Bellamy River. The Oyster River Watershed Association monitors for these same parameters at four sites on the Oyster River and its tributaries.

- At this time, the NH Volunteer Lake Assessment Program (VLAP) monitors in Barrington only at Ayers Lake. However, the UNH Lay Lakes Monitoring Program collects water quality data at Mendums Pond, Nippo Lake, North River Lake, and Swains Lake using local volunteers and volunteer monitoring groups. These programs sample a variety of parameters including water clarity, turbidity, dissolved oxygen, conductivity, temperature, pH and alkalinity, total phosphorus and chlorophyll-a. The Lay Lakes program conducts weekly monitoring and monitors water quality trends over time. Annual reports are produced and are available from the Lay Lakes Program.

- DES staff also conducts periodic river and lake surveys. The Department may deploy short or long-term water quality monitoring data loggers to study water quality parameters over time.

- Through the NH Coastal Program, DES conducts a Coastal Volunteer Biological Monitoring Program (CVBAP) on rivers and streams within the coastal watershed. This program inventories macro-invertebrates (bugs) in stream segments to provide screening-level assessments in wadeable streams to evaluate the overall biologic health of the stream. This program assists DES in making decisions on where more detailed investigations may be warranted. In Barrington, the CVBAP program has monitored at two sites on the Isinglass mainstem and at Nippo Brook.

Summary of Water Quality Data in Barrington

Lakes and Ponds

Lakes are surveyed to measure their trophic status to evaluate impacts from acid rain; to determine the presence or absence of exotic aquatic weeds; and to assess compliance with state water quality standards. The collected information is also used to establish baseline conditions for future comparisons, and to evaluate long-term trends by comparing current conditions with historical data. The trend analysis is useful for determining general trends in a large number of lakes.

Lakes follow a natural aging process whereby they become nutrient enriched and gradually fill in. This process can be greatly accelerated by human activities. Increases in nutrients, especially nitrogen and phosphorus tend to increase plant growth, which in turn impacts overall lake water quality. Lakes are classified into three trophic classes based on algal production, rooted plant growth, water clarity, and bottom dissolved oxygen level. These trophic classes provide an estimate of the lake's biological condition.[31]

Oligotrophic lakes are the most pristine and are characterized by high water clarities, low nutrient concentrations, low algae concentrations, minimal levels of aquatic plant weed growth, and high dissolved oxygen concentrations near the lake bottom. Eutrophic lakes have low water transparencies, high nutrient concentrations, high algae concentrations, large stands of aquatic plants, and very low dissolved oxygen concentrations near the lake bottom. Mesotrophic lakes have qualities between those of oligotrophic and eutrophic lakes.[32] Summaries of the NH Lay Lakes reports, and DES aquatic lake surveys for Barrington's monitored lakes are available from the two programs.

Table 7-4: Barrington's Lake Water Quality Summary

Lake	Status	Latest Survey Date
Ayer's Lake	Mesotrophic	2007
Long Pond	Eutrophic	2004
Little Long Pond	Mesotrophic	1991
Mendums Pond	Oligotrophic	2005
Nippo Lake	Mesotrophic	2006
North River Lake	Mesotrophic	2007
Round Pond	Oligotrophic	1999
Stonehouse Pond	Mesotrophic	1988
Swains Lake	Mesotrophic	2007
Winkley Pond	Mesotrophic	2005

[Sources: NHDES Survey Lake Data Summary – 2005; NH Volunteer Lake Assessment Program; and NH Lay Lakes Monitoring Program Water Quality Monitoring summaries for Barrington lakes]

[31] *Quality of New Hampshire Lakes and Ponds – A Layman's Guide* (2001) NHDES, Lake Trophic Survey Program at http://des.nh.gov/organization/divisions/water/wmb/lakes/documents/laymans_guide.pdf

[32] *Nippo Lake Water Quality Monitoring: 2006 Summary and Recommendations* (2006) Robert Craycraft and Jeffrey Schloss, NH Lake Lakes Monitoring Program. Center for Freshwater Biology, UNH.

Watershed Assessments

The NH DES publishes a "Report Card" of watershed quality as part of the state's requirement to biennially report to EPA on water quality under the Clean Water Act Section 305(b) and Section 303(d) programs. Each sub-watershed is identified by a Hydrological Unit Code (HUC). Water quality Assessment Units (AU's) are assigned within each subwatershed and encompass a more localized geographic extent. These AU's are periodically assessed at one or more sampling sites for the water's ability to support functions including aquatic life; primary and secondary contact uses such as swimming and boating; and safety of fish for human consumption.[33] Much of the data comes from field sampling conducted under the state's various volunteer assessments and monitoring programs described above.

Detailed reports for each subwatershed and each Assessment Unit site are available at the DES website http://www2.des.nh.gov/SWQA/SWQAList.aspx. The most recent reports to EPA, including lists and maps of impaired waters are available at http://des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm.

The reader is cautioned that the data detailed in the DES Watershed Report Cards should be carefully analyzed before attempting to use it for local planning purposes, because:

- Assessment summaries are based on very limited and spotty data collected at different assessment units at different times and are highly dependent upon weather, precipitation, and stream flow (e.g., they provide snapshots not trends).
- Some Assessment Units included in the Watershed Report Card summaries are located outside Barrington's town boundaries.
- Waterbodies are categorized as "impaired" even if conditions such as low pH or low dissolved oxygen, are naturally occurring and not the result of human activity.
- All waterbodies in New Hampshire are categorized "impaired" for fish consumption due to mercury deposition.

A comprehensive watershed assessment for the Mendums Pond Watershed was recently completed. This study, conducted by the NH Center for Freshwater Biology at UNH was designed to provide scientifically-based information to support proactive natural resource planning within the watershed. The study recommendations include minimizing impervious surfaces in the watershed(see Section 10.2); careful management of development on surrounding steep slopes (see Section 3.1); and maintaining or replanting vegetated riparian buffers to reduce runoff and erosion potential (see Section 7.5). [34]

Rivers and Streams

In general, Barrington's rivers and streams demonstrate good water quality. Many waters are low in pH, and in some locations are also occasionally low in dissolved oxygen. This is often due to the presence of wetlands or stagnant water caused by beaver dams. Wetlands can lower the pH of

[33] The most recent report cards for Barrington's sub-watersheds were reported in 2008. These reports are available at http://www2.des.nh.gov/SWQA/SWQAList.aspx.

[34] *Final Report – Nutrient and Water Budget – Mendums Pond Watershed Assessment* (2009) NH Center for Freshwater Biology.

a river naturally by releasing tannic and humic acids from decaying plant material. Turbidity is generally low indicating good water clarity. High conductivity can be the result of road salt runoff and is generally higher at more downstream sites near roadways. E coli sample results can range widely, and are highly influenced by the presence of wildlife, recent precipitation events, or failed septic systems. Detailed monitoring reports for the stream stations in Barrington are available at http://des.nh.gov/organization/divisions/water/wmb/vrap/data.htm.

Biological Assessments

The CVBAP biological monitoring begins in late August and continues throughout September. Each site is sampled one time each season. During sampling volunteers collect, sort, enumerate, and identify macro-invertebrates to order level. Habitat and water chemistry data are also collected. A "biotic score" is calculated for each site. A biotic score is assigned based on the sample composition, total number of invertebrates identified, and a set of values assigned to each macro-invertebrate order representing its tolerance to pollution. The results from the three Barrington sampling sites demonstrate a biotic score associated with "good" water quality at each site.

7.5 Shorelands and Riparian Areas

Shorelands, also called riparian areas, refer to the naturally vegetated upland areas immediately adjacent to a lake, pond, stream, river, or wetland. Because of the close proximity to surface waters and wetlands, riparian areas play an important role in maintaining the health of the surrounding environment and ecological systems. Maintaining riparian areas in a naturally vegetated condition within a certain minimum distance from surface waters and wetlands protects water quality and wildlife and aquatic habitat. Vegetated shoreland areas stabilize soil, reduce floodwaters, moderate water temperature through shading, and filter sediments and nutrients from runoff.

Riparian areas also provide important functions and services for wildlife including food, shelter, water, travel corridors, and nesting areas. Riparian areas can be actively managed to attract wildlife and can be restored with native plantings and/or by allowing natural regeneration of vegetation. Refer to the publication *Protecting and Enhancing Shorelands for Wildlife* for a list of recommended plantings and their wildlife value.[35] It should be noted that riparian areas are also highly vulnerable to invasive plant species such as Japanese Knotweed, which can rapidly proliferate via seed or root spreading along a water channel.

Floodplains are particularly important riparian areas, and consist of the flat or nearly flat land directly adjacent to a stream or river that experiences occasional or periodic flooding. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream. These are accumulations of sand, gravel, loam, silt, and/or clay, and are often important as aquifers.

[35] University of New Hampshire Cooperative Extension publication *Protecting and Enhancing Shorelands for Wildlife*.

Floodplains can support particularly rich ecosystems, both in quantity and diversity and can contain 100 or even 1000 times as many species as a river. Wetting of the soil releases an immediate surge of nutrients: those left over from prior flooding, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive, and larger species enter a rapid breeding cycle. Opportunistic feeders (particularly birds) move in to take advantage. Nutrient production peaks and falls away quickly; however, the surge of new growth endures for some time. This makes floodplains and riparian areas particularly valuable for agriculture. [36]

Shoreland and Riparian Buffers

A buffer is a vegetated area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of a buffer is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment. Buffers minimize the impacts of impervious surfaces (see Section 10.2); prevent erosion; and protect the water quality of lakes, streams, wetlands, and drinking water by:

- filtering sediments
- acting as a pollution filter, transformer, and sink
- slowing the velocity of run-off
- stabilizing the bank and bed of surface waters
- creating wildlife and aquatic habitat
- improving recreational aesthetics[37]

The larger the buffer, the more water quality can be protected. Within a buffer of 100 feet, most contaminants and nutrients are removed.[38] Buffers that are naturally vegetated, whether with grass, forest, or scrub-shrub species, are most effective in providing wildlife habitat, removing pollutants, protecting resources from contamination, and preventing negative impacts resulting from human activity. The study *Introduction to Riparian Buffers*[39], offers guidelines for buffer widths by function provided as summarized in the table below.

[36] Wikipedia "Floodplain" at http://en.wikipedia.org/wiki/Floodplain

[37] NH Estuaries Project Buffers brochure at http://www.nhep.unh.edu/resources/pdf/buffers_protecting_water-1p-nhep-06.pdf

[38] Jack Munn, Chief Planner, Southern NH Planning Commission, presentation at 2008 New Hampshire Watershed Conference - Model Shoreland/Riparian Buffer Ordinance at http://des.nh.gov/organization/divisions/water/wmb/rivers/watershed_conference/documents/cspa_innovative_land_use.pdf

[39] Connecticut River Joint Commission. 2005. Introduction to Riparian Buffers. From: Riparian Buffers for the Connecticut River Valley, No.1. http://www.crjc.org/riparianbuffers.htm.

Table 7-5: Guidelines for Buffer Widths

Function	Description	Width (feet)
Bank Stabilization	Riparian buffer vegetation helps to stabilize streambanks and reduce erosion by slowing the flow of runoff. Roots hold bank soil together, and stems protect banks by deflecting the cutting action of waves, ice, boat wakes, and runoff.	50
Fisheries Habitat	Forested riparian buffers benefit aquatic habitat by improving the quality of nearby waters through shading, filtering, and moderating stream flow. Shade in summer maintains cooler, more even temperatures, especially on small streams. Cooler water holds more oxygen and reduces stress on fish and other aquatic creatures. A few degrees difference in temperature can have a major effect on the survival of aquatic species. Woody debris feeds the aquatic food web. It also can create stepped pools, providing cover for fish and their food supply while reducing erosion by slowing flow.	75
Nutrient Removal	The riparian buffer traps pollutants that could otherwise wash into surface and groundwater. Phosphorus and nitrogen from fertilizer and animal waste can become pollutants if more is applied to the land than plants can use. Because excess phosphorus bonds to soil particles, 80–85% can be captured when sediment is filtered out of surface water runoff by passing through the buffer. Chemical and biological activity in the soil, particularly of streamside forests, can capture and transform nitrogen and other pollutants into less harmful forms. These buffers also act as a sink when nutrients and excess water are taken up by root systems and stored in the biomass of trees.	125
Sediment Control	Riparian buffers help catch and filter out sediment and debris from surface runoff. Depending upon the width and complexity of the buffer, 50–100% of the sediments and the nutrients attached to them can settle out and be absorbed as buffer plants slow sediment- laden runoff. Wider, forested buffers are even more effective than narrow, grassy buffers.	150
Flood Control	By slowing the velocity of runoff, the riparian buffer allows water to infiltrate the soil and recharge the groundwater supply. Groundwater will reach a stream or river at a much slower rate, and over a longer period, than if it had entered the river as surface runoff. This helps control flooding and maintain stream flow during the driest time of the year.	200
Wildlife Habitat	The distinctive habitat offered by riparian buffers is home many plant and animal species, including those rarely found outside this narrow band of land influenced by the river. Continuous stretches of riparian buffer also serve as wildlife travel corridors.	300

[Source*: Stream Buffer Characterization in Coastal New Hampshire* (2006) Complex Systems Research Center at the University of New Hampshire]

Funded by the NH Estuaries Project, UNH's Complex Systems Research Center conducted a buffer characterization study of second-order and higher streams in the coastal watershed.[40] Existing GIS and remote sensing data were used to map anthropogenic factors including land use, impervious surface coverage, and transportation infrastructure, within standard buffers around each stream segment. These factors were then analyzed to produce a categorical indicator representing the status of each stream.

Consideration of each stream segment was determined for a buffer width of 150 feet for water quality, and a buffer width of 300 feet for habitat quality. These considerations were then combined with actual land use data. Finally, the buffer/land use composites were categorized based on the degree to which each buffer was impacted by human activity. Specifically, the buffer characterization categories reflect the percent of land area within each buffer which is classified as developed, used for transportation, or in use for agriculture, as specified in the table below.

Table 7-6: Barrington Stream Buffer Conditions

Buffer Characterization* (level of impact)	% Area of 150-foot buffer	% Area of 300-foot buffer
Intact (less than 10% impacted)	4.2	7.2
Mostly Intact (10-25% impacted)	0.8	2.6
Somewhat Modified (25-50% impacted)	0.3	0.8
Impaired (greater than 50% impacted)	0.0	0.1
Total Land Area (acres)	1,580 acres	3,210 acres
% Total Land Area	5.3%	10.8%

* Only second order and higher streams were included in this study.

[Source: *Stream Buffer Characterization in Coastal New Hampshire* (2006) Complex Systems Research Center at the University of New Hampshire]

A more detailed breakdown of Barrington's shoreline and buffer areas for various buffer widths is included in Table 10 in Appendix A. This information is included as a reference for the future evaluation of options for buffer regulation.

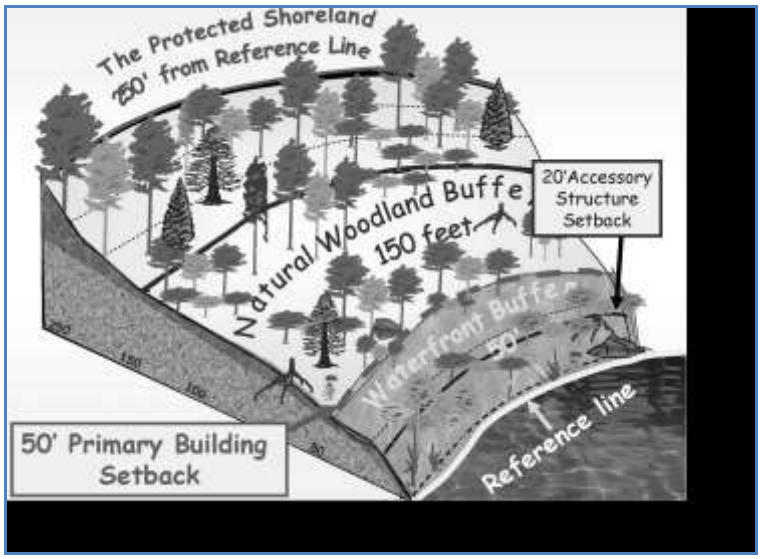
7.6 Comprehensive Shoreland Protection Act

In June of 2007 and again in July of 2008, the New Hampshire legislature enacted amendments to the Comprehensive Shoreland Protection Act (CSPA). The CSPA provides protection to the state's public waters by establishing a forested buffer area, restricted uses and development, and limits on impervious surfaces within 250 feet of lakes, great ponds, and fourth-order and larger rivers. All rivers designated under the state's Rivers Management Act (in Barrington the Isinglass River) also fall under CSPA protection. The lakes and ponds in Table 8 in Appendix A are all subject to the CSPA. In addition to the Isinglass River, the fourth-order stream segments on Stonehouse Brook from the juncture of Spruce Brook, and Nippo Brook from the juncture of

[40] *Stream Buffer Characterization in Coastal New Hampshire* (2006) Complex Systems Research Center at the University of New Hampshire at http://www.granit.unh.edu/Projects/Details?project_id=42

Stonehouse Brook are subject to the CSPA. The Figure below provides a graphical depiction of the regulated buffer zones in the protected shoreland area.

Figure 7-2: NH Comprehensive Shoreland Protection Act



[Source: DES Shoreland Protection Program]

7.7 Surface Water Drinking Water Sources

Most drinking water in Barrington is provided from groundwater sources as discussed in Section 8.0. However, Round Pond, Swains Lake, the Isinglass River, and the Bellamy/Oyster River headwaters areas all either directly or indirectly provide drinking water supplies to local and/or regional users.

- Round Pond, located in the northern corner of Barrington, serves as part of the water supply system for the City of Rochester. The water supply originates from the Berry River (an Isinglass River tributary) and includes Ox Bow, Whaleback, and Tufts Ponds in Farmington. Water flows between these ponds and the Berry River on to Round Pond and then to the Rochester Reservoir via a piped transmission system.

- The Isinglass River, after flowing through Barrington, provides drinking water to the City of Dover near its confluence with the Cocheco River in Rochester. The river also recharges numerous wells along its length, and recharges Barrington's primary aquifer (See Section 8.0).

- The Bellamy/Oyster River headwaters area, known as the Barrington Headwaters Reserve (Samuel A Tamposi Water Supply Reserve or SATWaSR) contains the headwaters for drinking water supplies for portions of Dover, Madbury, Durham, Lee, Portsmouth, and the University of New Hampshire. The property is a 1,378-acre tract of woods and wetlands in Barrington having over two square miles of undeveloped land just north of the Lee traffic circle. The property was permanently protected in 2001, as the

Samuel A. Tamposi Water Supply Reserve (SATWaSR). The Town of Barrington purchased the land and subsequently secured a conservation easement held by the Society for the Protection of New Hampshire Forests. Protection of this parcel constitutes an enormous level of protection for future drinking water supplies throughout the region.

- The Tibbetts Road Superfund Site (discussed in Section 10.1) contributed to contamination of residential drinking water wells. Through cooperative federal, state, and local efforts, an emergency water supply system was constructed in 1986 to replace contaminated water supplies. Funded by the EPA Superfund program, the project included the construction of an infiltration well system; a pump station; and a storage facility adjacent to Swains Lake, which serves as the water source. The water supply system is designed to service up to 70 residences in designated risk areas and is managed by the Swains Lake Village Water District.

7.8 Recommendations

7-1 Provide information about, and encourage participation of town residents in voluntary water quality monitoring, and lake and stream assessment activities to protect water quality.

7-2 Educate landowners about practices they can implement to protect water quality, including septic system maintenance, lakeside and streamside landscaping, alternatives to the use of fertilizers near water bodies, invasive species, and erosion control measures.

7-3 Develop lake inventories using NH comprehensive lake inventory program *The New Hampshire Guidelines for Coordinated Lake Management and Shoreland Protection Plans and The New Hampshire Comprehensive Lake Inventory* (July 2008) NH Department of Environmental Services at http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/nhdes-wd-08-8.pdf

7-4 Provide education and information at the Town Offices, the Library, at Town Meetings, in workshops, tours, and at other events in the form of handouts, factsheets and resource materials regarding specific water quality and water protection issues.

7-5 Work with UNH and partner agencies to develop and make available to Town officials and the public, watershed maps for each of the major waterbodies in Barrington.

7-6 Update the Town's Zoning Ordinance and Zoning Map to reflect amended NH Shoreland Protection Act setbacks and buffers around affected public waters.

7-7 Support nomination of Oyster River to NH Rivers Protection Program.

7-8 Support implementation activities of the Isinglass River Management Plan.

7-9 Support active stewardship of SATWASR, and/or organize a volunteer group to monitor and steward the SATWaSR property.

8.0 GROUNDWATER RESOURCES

8.1 Overview [41]

Groundwater represents the portion of the hydrologic cycle (evaporation, condensation, precipitation, and runoff) in which water enters the soil and is transmitted to a point of discharge, such as a stream or well. The movement of water through the ground's unsaturated zone varies in relation to soil characteristics, but is generally downward through permeable soil to the upper boundary of the "saturated zone" or water table. In permeable soils, the saturated zone may rise and fall in response to recharge from rainfall, or discharge to streams and wells. The configuration of the water table tends roughly to parallel the surface of the ground above it. Consequently, groundwater flows "downhill" within a drainage basin, like the surface waters above. Groundwater generally rises upward at the bottom of a valley to discharge into a flowing stream or pond through its bottom sediments. Drainage basins are therefore important in the analysis of groundwater aquifers. Groundwater occurs in three types of aquifers.

Till Aquifer

Till is the compact sediment covering most hills, slopes and uplands. It is an unsorted, un-stratified material composed or rock particles of all sizes including stones and boulders. This sedimentary material was deposited directly, as a mantle on the bedrock, by glaciation activity. Inadequate yields with respect to modern requirements, the susceptibility to pollution, and the economic ability of most landowners to pay for drilled bedrock wells are the principal reasons for the general abandonment of the thin till layer as a water supply source.

Stratified Drift Aquifer

A stratified drift aquifer, typically a layered deposit of gravel, sand and silt in river valleys, is the only ground formation sufficiently productive to meet large volume water needs such as public water supply wells. Stratified drift is unconsolidated sediment composed of inter-bedded layers of gravel, sand, silt, and clay. These materials were deposited during glacial retreat, and are generally restricted to the valley areas that served as drainage ways for glacial melt water. They also formed the sites of temporary glacial lakes. The stratified drift commonly forms an infilling of the pre-glacial bedrock valleys.

Both stratified drift and till contain open spaces or pores between individual grains, this is in contrast to bedrock which contains open spaces along cracks or fractures. Below the water table, such pores and fractures are filled with water. Stratified drift and till have greater porosities than fractured bedrock, and where saturated, they contain significantly more water per unit of volume. Water yield from stratified drift aquifers is highly dependent upon groundwater recharge from precipitation and snowmelt, and from atmospheric conditions (e.g. drought). These sand and gravel deposits are widespread in large river valleys and form broad, gently to steeply sloping hills on the landscape. Sustained pumping of wells tapping stratified drift can lower the water

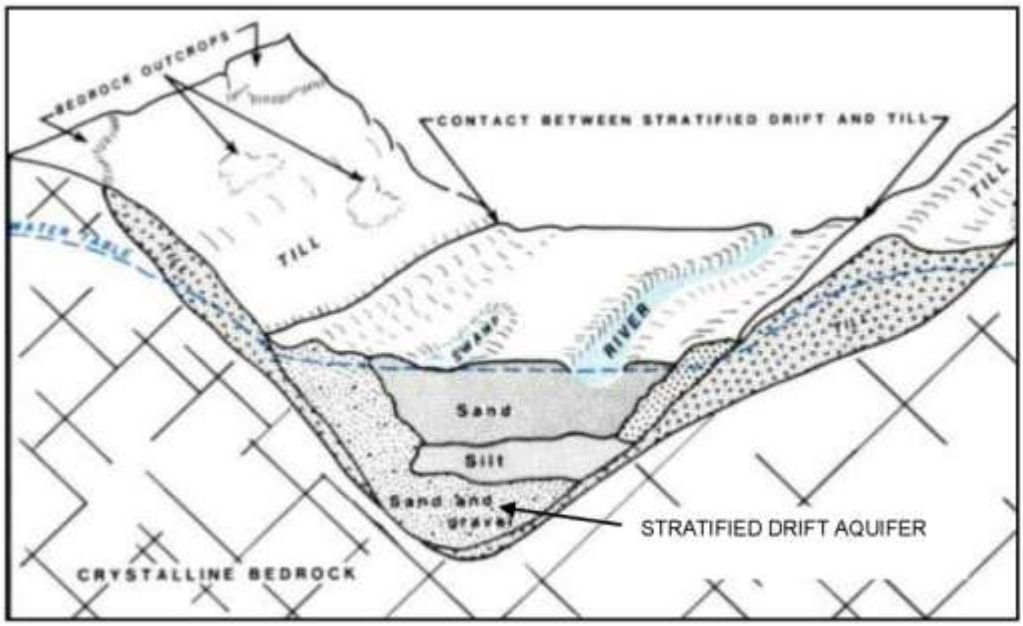
[41] Much of this discussion was taken from *Hydrologic Setting for Stratified Drift Aquifers,* Housatonic Valley Council of Elected Officials at http://www.hvceo.org/water/WATERTEXTHYDROSETTING.php

table beneath adjacent stream and lakebeds, inducing recharge from these surface waters to the adjacent aquifer.

Bedrock Aquifer

Bedrock aquifers consist of fractured bedrock and ledge (highly fractured shallow bedrock). Interconnected fractures form fracture systems, which are variable in their occurrence, connectivity, and potential water yield. Groundwater is transmitted in these hard rocks through fracture systems, or cracks, both horizontal and vertical, within several hundred feet of the surface. Groundwater may be stored within fractures, and wells drilled into large fractures or extensive fracture systems may yield high amounts of groundwater. However, wells that do not hit a fractured area are likely to yield little water if any. One of the most reliable but often costly methods for locating fractures and fracture systems is by conducting geophysical mapping of the subsurface bedrock. Test wells are necessary to quantify potential water yield.

Figure 8-1: Relationship Between Aquifer Types



[Source: adapted from *Hydrologic Setting for Stratified Drift Aquifers,* Housatonic Valley Council of Elected Officials at http://www.hvceo.org/water/WATERTEXTHYDROSETTING.php]

8.2 Groundwater Resources

Based on GIS data, Barrington has approximately 1,371 acres of till aquifer and 5,420 acres of stratified drift aquifer. Stratified drift aquifers account for over 17 percent of the Town's total area. Map 8 (Water Resources) illustrates the location of the largest area of stratified drift aquifer in the northeastern portion of Town. Areas not covered by till or stratified drift deposits are underlain by bedrock that is usually capable of producing sufficient water yield for residential

and commercial purposes. Since the town's homes and businesses rely almost exclusively on groundwater wells to supply drinking water, local zoning designates the entire town as a Groundwater Protection District.

8.3 Groundwater Uses

Groundwater is used primarily to supply drinking-quality water for residential, commercial, and industrial uses. With the exception of the Swains Lake Village Water District, all drinking water in Barrington comes from groundwater wells. The DES One-Stop Database reports over 1,400 registered private drinking water wells in town. DES does not regulate private drinking water wells beyond their initial installation and registration. There are no state or federal requirements to conduct subsequent water quality testing for private drinking water wells; however, DES recommends periodic well testing for a variety of potential contaminants. Most private water systems are also tested at the time of property transfer as a condition of sale.

Both the EPA and the state define regulated drinking water systems based on intensity and frequency of use. A Public Water System is one that has at least 15 service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. This includes three types of systems found in Barrington.

Community water systems serve at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents such as at apartment buildings, mobile home parks, or subdivisions. Non-transient non-community systems serve the same 25 people or more, over 6 months per year, such as at schools, or private businesses that have their own drinking water supply. A non-community transient system serves less than 25 people for less than 6 months of the year, and includes restaurants, campgrounds, and other types of service-related businesses or facilities.[42]

Table 8-1: Barrington's Public Drinking Water Supplies

Type	Number of Systems	Population Served	Number of Service Connections
Community	13	1,329	543
Non-Community Non-Transient	8	1,742	9
Non-Community Transient	20	1,454	105
Total	41	4,525	657

[Source: DES OneStop Database]

All public water systems are required to periodically monitor and report on primary and secondary drinking water quality parameters including coliform bacteria, lead and copper, pesticides, volatile organic compounds and inorganic compounds. Data is available at the NH DES OneStop Data webpage for Public Water Systems at http://www2.des.state.nh.us/OneStop/Public_Water_Systems_Query.aspx

[42] RSA 485:1-a Public Drinking Water Protection Program.

8.4 Wellhead Protection Areas

The EPA Wellhead Protection Program is a pollution prevention and management program used to protect groundwater- based sources of drinking water. The national Wellhead Protection Program was established in 1986 by the Safe Drinking Water Act. This program is delegated by EPA to the states. The DES administers the program under its Drinking Water Source Protection Program.

A wellhead protection area (WHPA) is the area surrounding a public water supply well from which water and contaminants are likely to reach the well. NH DES recognizes WHPAs for community water systems and for non-transient, non-community water systems, but not for transient systems. The purpose of wellhead protection is to prevent the contamination of groundwater used for drinking water. WHPAs can be delineated in several different ways, and vary in size depending upon the quantity of groundwater withdrawn. [43] For Barrington, wellhead protection areas around applicable public water supply sources are illustrated on Map 8 (Water Resources).

DES has conducted assessments of public water supplies for vulnerability or susceptibility to contamination based on fourteen criteria. The assessment does not provide an overall "score", but totals rankings of low, medium and high for each of the fourteen criteria. Data for public water supplies in Barrington is summarized at http://des.nh.gov/organization/divisions/water/dwgb/dwspp/reports/documents/barrington.pdf

8.5 Recommendations

8-1 Coordinate with surrounding towns such as Madbury, Lee, Durham and Dover to review the Groundwater Sustainability in the Seacoast Region study (due to be published in 2009) for local planning for future water supply contingencies in case of emergencies and shortages.

8-2 Review the forthcoming report, Land Use and Groundwater Quantity Management Document for Communities DES (due in 2009) and evaluate options for additional groundwater protection and management for the Town.

8-3 Conduct more detailed studies of aquifers in Barrington for potential future municipal water supply identification.

8-4 Provide information to private well owners about the potential for arsenic and uranium in drinking water, and encourage the testing of private wells.

8-5 Provide education and information to the public on the importance of protecting groundwater resources. Work with students/schools to develop groundwater and drinking water projects and curriculum.

[43] *Delineating Wellhead Protection Areas* Factsheet WD-DWGB-12-2 (2007) NHDES at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-12-2.pdf

9.0 WETLANDS

9.1 Overview

The U.S. Fish & Wildlife Service defines wetlands ecologically as *"lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year."*[44]

The U.S. Army Corps of Engineers (Federal Register 1982) and the EPA (Federal Register 1980) jointly define wetlands for regulatory purposes as *"Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."* [45]

A wetland is thus characterized by three aspects, each of which must be present in order to define a wetland for regulatory purposes.[46]

- Hydrophytes: vegetation specifically adapted to wet conditions, to grow partly or wholly in water.
- Hydrology: the level of groundwater and surface water within the soil profile, or at the intersecting land surface.
- Hydric soils: formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Wetlands provide some important ecological and environmental functions and values[47]:

- filter and store sediments and nutrients
- act as a filter and storage area for pollutants
- slow the velocity of stormwater run-off, and reduce sedimentation and erosion
- slow and store flood waters
- promote groundwater infiltration and protect groundwater discharge
- provide important habitat for wildlife and aquatic species
- provide recreational, educational and research opportunities

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[44] *Classification of Wetlands and Deepwater Habitats of the United States* by Lewis M. Cowardin, U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, Jamestown, ND, Virginia Carter, U.S. Geological Survey, Reston, Virginia, Francis C. Golet, Department of Natural Resources Science, University of Rhode Island, Kingston, RI, and, Edward T. LaRoe, U.S. National Oceanographic and Atmospheric Administration, Office of Coastal Zone Management, Washington, DC. Performed for U.S. Department of the Interior, U.S. Fish and Wildlife Service, Office of Biological Services, Washington, DC FWS/OBS-79/31 December 1979.

[45] 1987 edition of the Corps of Engineers Wetlands Delineation Manual, Part II Technical Guidelines at http://www.wetlands.com/regs/tlpge02e.htm

[46] *Corps of Engineers Wetlands Delineation Manual. January 1987 – Final Report*, US Army Corps of Engineers pp. 9-10.

[47] *Highway Methodology Workbook Supplement* (September, 1999) US Army Corps of Engineers.

In an increasingly developed landscape, wetlands continue to provide refuge for many wildlife species that require habitat to rest, feed, seek shelter, and reproduce. Particularly, many bird species rely on the shelter provided by wetland vegetation for nesting and as a safe haven or "stopping over" point when migrating through or to New England. Many threatened and endangered species are associated with wetlands for at least part of their life cycle. Wetlands also serve as "stepping stones" throughout the local and regional landscape for a variety of species that migrate overland from one habitat type to another including animals, birds, turtles and frogs, and other amphibians.

Wetland buffers are the vegetated areas adjacent to a wetland that reduce the adverse effects of human activities on these resources (see Section 7.5). The primary function of a wetlands buffer is to physically protect and separate a wetland from disturbance by:

- absorbing and filtering runoff to protect water quality
- intercepting and slowing runoff to prevent erosion
- providing and protecting quality habitats for wetland species and upland species
- improving landscape aesthetics
- maintaining recreational uses
- buffering wetlands from human noise and encroachment

9.2 Wetland Resources

There is a diversity of wetland types in Barrington, including freshwater emergent, forested/shrub and pond types, and riverine (associated with rivers and streams) and lacustrine (associated with lakes and ponds) types. The U.S. Fish and Wildlife Service, as part of the National Wetlands Inventory (NWI), has mapped wetlands greater than 2 acres in size from aerial photos. The NWI wetlands do not include all wetlands, particularly those that do not typically have standing water in the spring or are small in size (less than 1 acre). Therefore, NWI data may underestimate the amount of total wetland coverage.

Map 9 (Wetlands) shows the locations of wetlands in Barrington, based on the NWI data. Table 11 in Appendix A lists acreages for different types of wetlands. According to the NWI, Barrington has approximately 4,750 acres of wetlands including open waters. Over 2,800 of these acres (including associated open waters) lie within 150 feet of a road, making the majority of wetlands in the Town especially vulnerable to impacts from stormwater runoff and development. Barrington's zoning ordinance requires a minimum 50-foot buffer from the edge of wetlands, and a minimum 100-foot buffer from the edge of prime wetlands, as described below.

The Strafford Regional Planning Commission (SRPC) reviewed land cover aerial photographic data for the Town, and has included additional wetlands not identified by the NWI on Map 2 (Land Use) and in Table 1 in Appendix A. According to that data source, Barrington has nearly 3,700 acres of wetlands excluding open waters, covering approximately 12 percent of the Towns' total area.

Prime Wetlands

Prime wetlands are resources that, because of their size, unspoiled character, fragile condition or other relevant factors, make them of substantial significance to the community and regional ecological systems. As defined in RSA 482-A:15, prime wetlands status is designated by the municipality, following completion of a wetland study consistent with the methodology described in the RSA, and submitted for acceptance to the NH Department of Environmental Services, Wetland Bureau. Barrington has designated approximately 1,864 acres of wetlands as prime wetlands, or 6 percent of the Town's total area and nearly half of the total wetlands area in Town. Prime wetlands are also shown on 1991 Town tax maps and in the accompanying report *Prime Wetlands Report, Town of Barrington, New Hampshire, January 1991*. Prime wetlands designation provides added regulatory protection by ensuring that state wetlands permit applications receive a higher level of scrutiny and public input.

Vernal Pools [48]

A vernal pool is a temporary body of water that provides essential breeding habitat for certain amphibians – such as wood frogs, and spotted salamanders, and invertebrates such as fairy shrimp. These unique wetlands typically cycle annually from flooded to dry. Vernal pools vary in size, shape, and location. Some are as small as several square feet in area; others extend to several acres during maximum flooding. The pools appear year after year in the same spots, except during exceptionally dry years.

Figure 9-1 – Vernal Pool in Spring

photograph © Tom Lautzenheiser
[Source: The Vernal Pool Association http://www.vernalpool.org/images/03_wet.jpg]

Pools occur in a variety of sites, including small depressions in the woods, kettle holes, oxbows on river floodplains and gravel pits. Many occur in isolated depressions in areas far away from rivers and streams, lakes, and typical wetland areas. These differences are of little significance to the wildlife that depends on vernal pools for habitat; for them, the important considerations are water, food, cover (concealment) and lack of some predators.

[48] This discussion taken from *Identification and Documentation of Vernal Pools In New Hampshire* (2nd edition 2004). NH Fish & Game Department. pp.1-2 at http://www.wildlife.state.nh.us/Wildlife/Nongame/RAARP/Vernal_pool_manual.pdf

Vernal pools are valuable as wildlife habitat because of the wide range of species that use them, including turtles, frogs, salamanders, fairy shrimp, clam shrimp, fingernail (or "pill" or "pea") clams, caddis flies and other aquatic insects. Some of these species (certain invertebrates, salamanders, and frogs) are rarely found outside of areas containing vernal pools. Vernal pools provide a safer breeding ground for these species than permanent waters, because there are no fish to eat the eggs or larvae. In addition to the species specially adapted to vernal pools, these wetlands serve as local watering holes for nearby animals; a feeding ground for birds, snakes, turtles and some mammals; or a hibernation site for turtles. A profusion of plant life may grow in and around the depression where the pools form, providing food, and cover for other species.

9.3 Recommendations

9-1 Revise zoning ordinance language to exclude Hydric B soils from the minimum required upland area for a new lot.

9-2 Inventory vernal pools on town-owned and conservation lands, and locate groups of nearby vernal pools that form larger habitats for amphibians and turtles.

9-4 Encourage volunteer participation in NH F&G's Reptiles and Amphibians Reporting Program – especially with students/schools.

9-5 Identify wetland areas in Town that may be suitable for the DES in lieu fee program for re-creation, restoration, and preservation, such as properties adjacent to SATWaSR.

9-6 Update the Town's prime wetlands inventory with additional field verification. Revise prime wetlands maps as required.

10.0 POTENTIAL THREATS TO WATER RESOURCES

Population growth, increasing water demands, large groundwater withdrawals, changing land uses, aboveground and underground storage tanks, septic systems, agriculture, mining and forestry practices, and contaminated runoff from impervious surfaces all pose threats to the quantity and quality of local surface and groundwater resources. Naturally occurring compounds such as arsenic and radon found in some groundwater drinking supplies in the region are also of potential concern.

EPA divides water pollution sources into two categories: point sources and non-point sources. Point sources of water pollution are stationary locations such as sewage treatment plants and factories. Non-point sources are more diffuse and include agricultural runoff, mining activities, and paved roads. Under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating municipal and industrial point sources that discharge pollutants into waters of the United States. EPA also administers the NPDES Stormwater permit program which regulates stormwater discharges at construction sites greater than one acre, and for certain industrial activities.

10.1 Point Source Pollution

According to EPA Region 1, which administers NPDES permits for New Hampshire, there are no individual permitted point source discharges in Barrington. However, the DES OneStop Database lists several other sources of potential water pollution in town including one aboveground tank installation and 14 underground storage tank sites - associated with gas stations, schools, and some businesses. There are also 51 registered hazardous waste generators in Barrington. Historically, there have been at least 31 reported site remediation projects or hazardous materials cleanups conducted in Town, by far the largest of which is the Tibbetts Road Superfund Site.

Tibbetts Road Site [49]

In 1986, the Tibbetts Road site was included on the U.S. EPA's National Priorities List for uncontrolled hazardous waste sites (Superfund Program). The Tibbetts Road Site is a former two-acre residential property where the owner possessed and stored over 300 55-gallon drums containing various hazardous substances, from 1944 to 1958. Many of the drums were found to be leaking and rusted, and contained thinners, solvents, antifreeze, kerosene, motor and transmission oil, polychlorinated biphenyls (PCBs), grease, and brake fluid. EPA removed all deteriorating drums in 1984. The groundwater was determined to be contaminated with volatile organic compounds (VOCs), including benzene, trichloroethylene (TCE), toluene, xylenes, and arsenic. Soil was found to be contaminated with solvents, PCBs, and dioxin.

[49] This discussion taken from EPA Waste Site Clean up – Site ID# 0101208 Site Page at http://yosemite.epa.gov/r1/npl_pad.nsf/31c4fec03a0762d285256bb80076489c/c875c2d48055e87a8525691f0063f6fe!OpenDocument

Approximately 2,100 people living within 3 miles of the site depend on ground water as their drinking water source. People who accidentally ingest or come into direct contact with contaminated ground water are potentially at risk.

In 1984, the New Hampshire Water Supply and Pollution Control Commission (now DES) found drinking water wells serving approximately 20 people near the site to be contaminated. In 1987, EPA and DES established a water supply system to provide drinking water for the residents affected by the site, with Swains Lake providing the source of this alternate water supply. This water supply system comprises the Swains Lake Village Water District and serves the residents of 46 of the approximately 70 homes within a one-half mile radius of the site. After the water supply was established, all affected residential wells were permanently capped.

Groundwater monitoring continues at the Tibbetts Road site to assess the effectiveness of the ground water remediation. Groundwater treatment included a vacuum extraction system that actively removed and captured site contaminants; and planting of 1,400 poplar trees to reduce groundwater flow and enable native micro-organisms to continue to consume contaminants. EPA completed its first five-year review of the effectiveness of this treatment in 2003 and a second review in 2008. Both documents confirmed that progress is being made in the cleanup of the site.

The 2008 Five-Year Review found that there were no current issues affecting the protectiveness of the cleanup approach, and that the soil and groundwater treatment strategies already in place continue to be protective of human health and the environment. The levels of VOCs in the shallow groundwater beneath most areas of the site (which historically showed some of the highest concentrations) are now at, or approaching cleanup levels. However, a small portion of weathered bedrock located to the northeast of the site has shown more limited progress in achieving the required cleanup levels for VOCs. EPA and the Potentially Responsible Party (Ford Motor Company) are exploring additional means to address this contamination.

The 2008 Five-Year Review did identify potential future issues that may affect protectiveness - primarily that groundwater has not been restored to protective levels and that the water supply system that serves the residents surrounding the site has operational issues. The water supply system complies with current standards; yet future standards and a general deterioration of the surface water supply will likely compromise the ability of the water treatment system to deliver acceptable drinking water into the future.

10.2 Non-Point Source Pollution

Non-point source pollution occurs when rainfall, snowmelt, or irrigation runs over land or through the ground, mobilizes pollutants, and deposits them into surface waters or introduces them into groundwater. These pollutants can include oil, salt, and sand from roadways; agricultural chemicals from farmland; sediments from construction sites, crop and forest lands, and eroding streambanks; nutrients and toxic materials from developed areas; and failed septic systems. The effects of nonpoint source pollutants on water quality vary and may not always be fully assessed (see Section 7.4). However, it is well documented in scientific literature that these pollutants have harmful effects on drinking water supplies, recreation, fisheries, and wildlife.

Current and historical data and trends indicate that water quality and quantity is changing. Poorly designed and executed landscape change is the primary cause. As evidenced by the 2006 and 2007 regional flood events, stormwater runoff and increasing amounts of impervious surface are negatively affecting New Hampshire's surface waters. Nonpoint source pollution is the leading remaining cause of water quality problems across the country.[50]

Stormwater

Stormwater is generated by precipitation, surface runoff and snow melt from land, pavement, building rooftops and other impervious surfaces. The introduction of pollutants can degrade water quality for public drinking water supplies and for aquatic habitat. Discharge points for stormwater runoff include detention basins, infiltration areas or basins, drainage ditches, and swales. Such diversion of runoff through artificial conveyances and infrastructure diverts water from the natural hydrologic flow system. This can lead to alteration of natural infiltration and migration of surface water and groundwater that are critical for maintaining groundwater recharge, stream base flow, and wetlands. Stormwater runoff is also discharged to surface waterbodies through overland flow and infiltration to the groundwater table with eventual discharge to surface waters and wetlands.

Impervious Surfaces

Impervious surfaces are structures that prevent rainwater from penetrating into the ground, such as parking lots, roads, sidewalks and roofs, and compacted urban soils. When it rains or when snow melts, water runs off impervious surfaces with greater quantity and velocity than would occur naturally. This results in erosion and flooding. Furthermore, pollutants like heavy metals, toxics, trash, pathogens, sediment, hydrocarbons, fertilizers, and pesticides are washed quickly into surface waters where they damage aquatic systems and lower water quality. The more impervious surfaces (from increased development) present in an area, the lower the water quality of local streams and rivers.[51] The proximity of discharges from stormwater management structures or from overland flow to surface waterbodies, and the vegetative condition of the riparian area can have a significant effect on pollutant loading in surface waterbodies.

UNH's Complex Systems Research Center estimated changes in impervious surface coverage in towns throughout the NH coastal region from 1990 to 2005, as shown in the table below.

[50] *What is Non-Point Source Pollution, Q&A*, taken from EPA brochure EPA-841-F-94-005, 1994).
[51] NH Estuaries Project Buffers brochure at http://www.nhep.unh.edu/resources/pdf/buffers_protecting_water-1p-nhep-06.pdf

Table 10-1: Barrington's Impervious Surface Cover and Population, 1990-2005

	1990	2000	2005
Impervious Surface Cover (acres)	763.5	1186.7	1387.0
% Total Town Land Area	2.6	4.0	4.7
	1990	**2000**	**2006 estimate**
Population	6,156	7,527	8,275
Percent Increase	--	22.3%	9.9%

[Sources: *Impervious Surface Mapping in Coastal New Hampshire* (2006), Complex Systems Research Center at the University of New Hampshire; and Economic & Labor Market Information Bureau, NH Employment Security, 2007]

The current impervious surface cover for Barrington of 4.7 percent indicates that surface water quality should not be negatively impacted. Not surprisingly, the highest concentrations of impervious surfaces are located along the Route 9 and Route 125 corridors as shown on Map 10 (Impervious Surfaces). These areas therefore, may contribute to localized water quality impacts. Studies conducted in the northeast have documented that by converting as little as 10 percent of a watershed to impervious surfaces, stream water quality, stream channel structure, and species habitat begins to deteriorate. Above 25 percent, impervious surface water quality is seriously degraded. The 2005 report *The Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03*[52] found that sites having between 8 and 14 percent impervious surface in the region showed changes in stream quality as measured by reductions in the combined water quality, habitat condition and biological condition score for those sites.

Erosion and Sedimentation

The removal of vegetative cover and roots systems compromise the ability of vegetation to stabilize soil; reduce velocity of runoff; shield the soil surface from rain; and maintain the soil's ability to absorb water. Specific erosion and sedimentation impacts related to the loss of vegetation, pollution of the water supply, and alteration of topography include:

- Streambank erosion caused by an increase in the volume of stormwater runoff.
- Alteration of existing drainage patterns.
- Destabilization of steep slopes by removal of trees and other vegetation.
- Reduced potential for groundwater recharge due to coverage by impervious surfaces or drainage control methods that convey stormwater off-site.
- Runoff of chemical and organic pollutants (nutrients) into surface waters or water supplies.

New construction or changes in land use typically involve the removal of vegetation, the alteration of topography, and the covering of some previously vegetated surfaces with impervious surfaces. These changes to the landscape may result in soil erosion and sedimentation

[52] Deacon, Jeffrey, R., Soule, Sally A., and Smith, Thor E., *Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03*, U.S. Geological Survey Scientific Investigations Report 2005-5103.

as soil travels to surface water as runoff during storms, at an increased velocity due to the lack of vegetative cover.

10.3 Water Withdrawals

As described in Section 7.7, surface waters in Barrington provide either direct or indirect drinking water supplies to users throughout the seacoast region. As populations continue to increase, additional demands may be put on these resources, potentially threatening their sustainability.

Since most drinking water comes from groundwater sources, large groundwater withdrawals pose an even greater threat to drinking water quantity and quality in Barrington and in surrounding communities.

A Commission to Study Issues Relative to Groundwater Withdrawals was established in the 2003 NH legislative session in order to clarify the hierarchy of water uses while considering existing property rights, to provide a balanced approach to water use among the state's many different water users; to review the process by which new water users may "reasonably and efficiently use the state water resources;" and consider potential regional impacts and local water management issues. In the 2008 NH legislative session, House Bill 1353 was introduced to grant additional local authority over large groundwater withdrawals, but this bill was amended and passed as Chapter 176, in order to make the role of municipalities a topic for a report by the study commission expected to be completed by November 30, 2009.

10.4 Recommendations

10-1 Provide information and education to landowners about the importance of protecting water resources and practices they can implement to minimizing non point source pollution including septic system maintenance, erosion control, maintaining vegetated riparian buffers, and minimizing impervious surfaces (see also recommendation 7-2).

10-2 Work with DES, Strafford Regional Planning Commission and the UNH Stormwater Center to develop best management practices for control of non-point pollution and stormwater management and treatment. These resources should be evaluated for possible inclusion in zoning ordinances, land use regulations and decision-making regarding stormwater impacts from development. See also publications from DES including the NH Stormwater Manual, Stormwater Management and Erosion and Sediment Control for Urban and Developing Areas in NH; and Best Management Practice for Urban Stormwater Runoff.

11.0 AREAS OF ECOLOGICAL SIGNIFICANCE

11.1 Overview

Sections 3.0 through 10.0 of this inventory have described the extent and variety of natural resources in Barrington. However, these natural resources should not be viewed independently of each other, as they combine synergistically to form various natural communities (ecosystems). Protecting natural communities is necessary to preserve biological diversity. Biological diversity or "biodiversity" describes the variety and variability of all living organisms in an area. This includes the entire diverse populations of plants, animals, fungi, algae, bacteria, and other microorganisms and their genetic variability; the natural communities in which they live; and the processes and interactions that weave biological and physical elements of an area into a complex web.[53]

New Hampshire is home to more than 15,000 species of plants and animals, 100 types of natural communities, and a variety of ecosystems. [54] This rich biological diversity, including plants and animals, and the habitats and ecological processes that sustain them, is a living legacy that helps sustain clean air and water, local resource and recreational economies, and quality of life. The intensity and nature of threats to biodiversity vary widely across the state and for different features of biodiversity, with some features relatively secure, and others severely imperiled. New Hampshire's biodiversity is increasingly vulnerable to ongoing development and habitat alteration. Already the effects can be seen, including:

- 11 species of animals and 13 species of plants have been extirpated from the state.
- 22 plant species, 30 animal species, and 25 natural community types in New Hampshire are considered globally rare or imperiled.
- New Hampshire is losing more than 13,000 acres of open space to development each year.
- We know of exemplary occurrences for fewer than 50% of the natural communities in the state, including common and widespread natural communities.
- There are few, if any, undisturbed aquatic ecosystems in the state
- Of the top ten environmental risks ranked by the New Hampshire Comparative Risk Project, 6 risks are related to loss, degradation, or alteration of land or water habitats.

11.2 Unfragmented Lands and Wildlife Habitats

Unfragmented Lands

Large acreages of forests, wetlands, and farmlands that are unfragmented by development or public roads are valuable for many reasons. Larger blocks of open or forested land provide habitat for mammals that have large home ranges and prefer to avoid human contact such as bobcat, bear, otter, and moose. Large forest blocks provide essential forest interior habitat for

[53] *New Hampshire's Living Legacy, the Biodiversity of the Granite State*, NH Fish and Game Department, 1996.
[54] This discussion was taken from: University of New Hampshire Cooperative Extension - *New Hampshire Living Legacy Project* website at http://extension.unh.edu/forestry/FORNHLL.htm

species such as some songbirds that need to be distanced from human activity, pets, and the forest edge in order to survive. These areas are more likely to support viable populations of species, and therefore act as a source of individuals that can interact and breed with populations in other blocks. Small block fragments may be unable to successfully support breeding populations. Persistent and widespread fragmentation may also lead to genetic changes and a loss of genetic diversity, as populations are subdivided into small locally breeding populations.

Unfragmented forest blocks are areas of forest not broken up by roads, other land uses, or waterbodies. A 500-acre block is big enough to support significant wildlife habitat, protect water quality, and allow some economic forest management.[55] Large forest blocks also enable landowners to conduct timber harvests that are economically viable; and minimize conflicts that can arise when managed forests and farms are surrounded and interspersed with development. Unfragmented lands also offer opportunities for remote recreation including hunting, hiking, biking, snowshoeing, and snowmobiling, where landowners allow.

Many large blocks of forest and undeveloped land are still intact in Barrington. Over 12,100 acres (approximately 40 percent of Barrington's land area) are considered unfragmented blocks. The location of these large blocks is shown in Map 6 (Unfragmented Forest Blocks). Table 11-3 in Section 11.3 below provides acreages and habitat importance. The map subtracts a 300-foot buffer around all roads (mostly Class V or state highways) and excludes developed lands. Waterbodies and streams are also shown on the map. Note that no minimum acre threshold was used to identify blocks.

Preserving unfragmented blocks of forest and open space is critical for sustaining wildlife populations. Development of the natural landscape results in the direct fragmentation and loss of habitat. Fragmentation reduces the quality of habitat by altering its size, shape, and distribution creating less interior space for wildlife to exist undisturbed by human activity.

Habitat Requirements for Local Species

Conserving large, unfragmented blocks lands and connections with other significant habitat areas, is important for preservation of species that need larger and diverse home ranges and territories. Habitat block size and range requirements vary widely among bird, mammal, and other native species. Many species can, and do thrive in unfragmented areas smaller than the minimums cited; however, reduced habitat size places stresses on them, making their populations more susceptible during times of drought, disease, or competition for basic resources. Species that require specialized habitat e.g. those that rely on specific plant communities for their life cycle, are particularly vulnerable to habitat fragmentation and loss. The following tables illustrate habitat requirements for wildlife species found in Maine[56]. While a comprehensive wildlife inventory has not been completed for Barrington, many of these species can be found

[55] *New Hampshire's Changing Landscape 2005- Population Growth and Land Use Changes: What They Mean for the Granite State*. (2005 update) The Society for Protection of New Hampshire Forests. p. 6.

[56] Source for Tables xx-a through xx-d: *Conserving Wildlife in Maine's Developing Landscape*. Maine Audubon Society (Spring 2000). Table 1, Appendix.

locally and/or regionally. Therefore, these tables are included to illustrate general habitat requirements.

Table 11-1a: Large Mammals Found in Southern and Central Maine

Species	Home Range*
Black Bear	19,200 acres
Bobcat	5760 acres
Fisher	4,747-9,600 acres
Mink	20-50 acres (females), 1280-2010 acres (males)
Moose	1,280-12,800 acres
River Otter	15-30 linear miles

* Home range is the primary area in which an individual animal lives, and includes areas for resting, sleeping, feeding, and breeding.

Table 11-1b: Turtles Found in Maine

Species	Home Range*	Additional Distances Traveled *(for nesting, migrating, feeding)*
Snapping Turtle	4.50 - 22 acres	Up to 5 miles
Common Musk Turtle	2.4 (females) acres 4.4 (males)	Less than 0.5 miles
Spotted Turtle	5 - 7 acres	Up to 1.25 miles
Wood Turtle	1446 river feet	Up to 6 river miles and 500 feet on land
Eastern Box Turtle	0.8 - 3 acres	Up to 0.2 miles
Eastern Painted Turtle	0 - 2 acres	Up to 1 mile or more
Blanding's Turtle	0 - 300 acres	Up to 4.20 miles

* Home range is the primary area in which an individual animal lives, and includes areas for resting, sleeping, feeding, and breeding.

Table 11-1c: Area Sensitive[+] Grassland Birds Found in Maine

Species	Minimum Block Size	Preferred Block Size
Upland Sandpiper	150 acres	500 acres
Bobolink	5 acres	75 acres
Eastern meadowlark	15 acres	20 acres
Grasshopper sparrow	30 acres	250 acres
Vesper sparrow	30 acres	50 acres
Savannah sparrow	20 acres	40 acres

\+ Bird species that are uncommon in smaller forests.

Table 11-1d: Area Sensitive[+] Forest Birds Found in Maine

Species	May Occur in Blocks <250 Acres	Occur in Blocks 250-500 Acres	Occur in Blocks 500-1000 Acres	Occur in Blocks >1000 Acres
American redstart		X	X	X
Black-and-white warbler			X	X
Black-throated blue warbler				X
Black-throated green warbler*			X	X
Blue-gray gnatcatcher				X
Brown creeper*			X	X
Canada warbler				X
Chestnut-sided warbler*		X	X	X
Common crow	X	X	X	X
Downy woodpecker**	X	X	X	X
Gray catbird**	X	X	X	X
Great crested flycatcher*	X	X	X	X
Hairy woodpecker		X	X	X
Hermit thrush			X	X
Least flycatcher		X	X	X
Louisiana waterthrush			X	X
Mourning warbler			X	X
Northern parula				X
Northern waterthrush			X	X
Ovenbird			X	X
Pileated woodpecker*			X	X
Red-eyed vireo*	X	X	X	X
Red-shouldered hawk			X	X
Rose-breasted grosbeak*	X	X	X	X
Rufous-sided towhee**		X	X	X
Scarlet tanager		X	X	X
Tufted titmouse*	X	X	X	X
Veery		X	X	X
White-breasted nuthatch	X	X	X	X
Wood thrush			X	X
Yellow-billed cuckoo**	X	X	X	X
Yellow-throated vireo*	X	X	X	X

+ Bird species that are uncommon in smaller forests.

* Some studies did not classify these species as area-sensitive.

** Some studies classified these species as area-sensitive, but most did not. These are more likely not area-sensitive.

11.3 New Hampshire's Wildlife Action Plan [57]

The NH Fish and Game Department collaborated with partners in the conservation community to create the state's first Wildlife Action Plan. The plan provides decision-makers with important tools for restoring and maintaining critical habitats and populations of the state's nongame species of conservation and management concern - those species identified by the Northeast Wildlife Diversity Technical Committee as a regional concern because of reduced populations or loss of habitat. The plan is a comprehensive wildlife conservation strategy that examines the health of wildlife and prescribes specific actions to conserve wildlife and vital habitat before they become rarer and more costly to protect.

Using Geographic Information Systems (GIS) data, biologists developed models of wildlife habitat to predict where habitats would be, based on known information such as soils, elevation, climate, landforms, and broad vegetative classes to predict the type of vegetation that would grow at a particular location. The NH Natural Heritage Bureau supplied additional data on natural communities. The NH Land Cover data, which shows locations of various categories of developed and undeveloped land was also used, as well as National Wetlands Inventory data for wetlands. For a complete explanation, refer to the NH Wildlife Action Plan's GIS metadata.

Sixteen types of habitat were modeled including:

- Five forest types: Hemlock-hardwood-pine, Appalachian oak-pine, Lowland spruce-fir, Northern hardwood-conifer, and High elevation spruce-fir.
- Three freshwater wetlands types: Marsh and shrub wetlands, Peatlands, and Floodplain forests.
- Three coastal habitats: Saltmarsh, Dunes, and Coastal islands.
- Three steep slope habitats: Alpine, Cliff, and Rocky ridge/talus slope.
- Two small-scale habitats: Pine barrens, and Grasslands.

Since the habitats are defined by vegetation type and structure, but based on the needs of wildlife, most forested wetlands are included in the forest habitats. In addition, since rare grassland bird species have specific nesting habitat needs that include a minimum acreage, grasslands were modeled and mapped only at 25 acres and above. Grasslands include croplands as they could easily be converted to grasslands.

Barrington's Natural Habitat Communities

As reported in the Wildlife Action Plan and in Table 11-2 below, Barrington has the following natural habitat communities:

- Appalachian oak-pine forests are found mostly below 900 ft. elevation in southern New Hampshire. These forests include oak, hickory, mountain laurel, and sugar maple, and are typically associated with warmer and drier climatic conditions. Appalachian oak-pine forests are fire-influenced landscapes with nutrient-poor, dry, sandy soils. They are home

[57] This discussion was taken from *The New Hampshire Wildlife Action Plan*. (2006) NH Fish and Game Department at http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm

to hognose snakes, whip-poor-wills, silver-haired bats and other species of concern. Intense development has dramatically reduced the area of this forest type, which comprises some 10 percent of the state's total land area, primarily in New Hampshire's southern tier, and over 15,000 acres - 48 percent of Barrington's total area.

- Floodplain forests occur 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. Their rich soils have been used in agriculture for centuries, such that many floodplains are no longer forested wildlife habitat. In Barrington, approximately 1,380 acres of 4.4 percent of the Town's total area are considered floodplain forest.

- Extensive grasslands are defined as areas greater than 10 hectares (~ 25 acres) that are dominated by grasses, wildflowers, and sedges with little shrub or tree cover. Some examples include hayfields, pastures, and cropland (cornfields and other row crops). Grasslands in NH must be mowed to prevent them from becoming shrub lands or forests. Only 8 percent of NH grasslands are currently protected under conservation easements. In Barrington, approximately 466 acres or 1.5 percent of the Town's total area are considered extensive grasslands.

- Hemlock-hardwood-pine forests are transitional forests, occurring between hardwood conifer and oak-pine forests. This common forest type is comprised of dry, sandy soils with red oak and white pine. When hemlock-hardwood-pine forests have been burned regularly over time, they may be able to support a pitch-pine sand plains system. In Barrington, this forest type accounts for over 10,000 acres or approximately 32 percent of the Town's total area.

- Marshland systems have a broad range of flood regimes, often controlled by the presence or departure of beavers. These systems, which provide an important food source for many species, are often grouped into three broad habitat categories: wet meadows, emergent marshes, and scrub-shrub wetlands. Marshes and wetlands filter pollutants, preventing them from getting into local streams, and help store water to reduce flooding.

- Peatlands have water with low nutrient content and higher acidity caused by limited groundwater input and surface runoff. Conservation of the 11 different natural communities that comprise peatlands is vital to the continued existence of many rare plant and wildlife species in New Hampshire. The most challenging issues facing peatlands habitat are development; altered hydrology (amount and flow of water); non-point source pollutants such as road salt, lawn fertilizers, and pesticides; and unsustainable forestry practices.

- Rocky Ridge or Talus Slopes are two related but distinct habitats. Talus slopes are comprised of loose or stable boulders and rocks and range from open, lichen-covered talus "barrens" to closed-canopy forested talus communities. Rocky ridges generally occur on outcrops and bedrock ridges and summits below the alpine zone. Talus slopes

and rocky ridges provide crucial habitat for several rare wildlife species in New Hampshire, including the timber rattlesnake and bobcat.

Table 11-2: Barrington's Significant Wildlife Habitats

Habitat Type	Acres	% Total Town Area
Appalachian Oak/Pine Forest	15,044.6	48.3
Floodplain Forest	1,380.3	4.4
Grasslands	465.9	1.5
Hemlock, Hardwood, Pine Forest	10,073.1	32.4
Marshlands	1,256.3	4.0
Peatlands	607.3	2.0
Ridge - Talus	27.0	0.1
Total Land Area	**28,854.6**	**92.3**
Wildlife Conservation Focus Areas	256.8	0.8

[Source: NH Fish and Game, Wildlife Action Plan, June 2006]

The Wildlife Action Plan Conservation Focus Areas are those places that combine a number of high-ranking condition habitats in one area. As the habitat areas overlap (e.g., watersheds overlap upland habitats, and some forests overlap the other habitats within them) the number of predicted high-ranking condition habitats in a particular area can be shown. The plan predicted only 256 acres of Wildlife Habitat Focus Area in Barrington. However, the other nearly 28,600 acres identified are still considered important wildlife habitats as shown on Map 6 (Unfragmented Forest Blocks), on Map 7 (Areas of Ecological Significance), and in the table below.

Table 11-3: Contiguous Forest Blocks by Dominant Habitat Type

Block No. *	Dominant Forest Habitat Type	Habitat Priority Rank**	Acres	% Total Town Area
1	Appalachian Oak-Pine	2	563.0	1.8
2	Appalachian Oak-Pine	2	1260.5	4.1
3	Appalachian Oak-Pine	2	1233.8	4.0
4	Appalachian Oak-Pine	2	479.0	1.5
5	Hemlock Hardwood-Pine	2	1170.5	3.8
6	Hemlock Hardwood-Pine	2	1426.9	4.6
7	Hemlock Hardwood-Pine	2	3734.9	12.0
8	Appalachian Oak-Pine	2	2294.1	7.4
	Total		**12,162.7**	**39.1**

* Block number as shown on Map 6 (Unfragmented Forest Blocks).

** The NH Wildlife Action Plan defines Habitat Priority Rank 2 as the Highest Ranked Habitat by ecological condition in the Biological Region.

[Source: NH Fish and Game, Wildlife Action Plan, June 2006]

11.4 The Land Conservation Plan for New Hampshire's Coastal Watersheds

New Hampshire's coastal watersheds contain exceptional and irreplaceable natural, cultural, recreational, and scenic resources. To advance the long-term protection of these resources, the State of New Hampshire, acting through the NH Coastal Program and the NH Estuaries Project (now the Piscataqua Region Estuaries Partnership), developed a comprehensive, science-based land conservation plan for the state's coastal watersheds. The state also engaged a partnership of The Nature Conservancy, The Society for the Protection of New Hampshire Forests, Rockingham Planning Commission, and Strafford Regional Planning Commission to develop the plan. The New Hampshire Charitable Foundation's Piscataqua Region supported this effort as a regional approach to setting land conservation priorities and strategies, and provided funding for the project.

The overarching goal of this land conservation plan is to focus conservation attention on those lands and waters that are most important for conserving water quality and living resources - native plants, animals, and natural communities in coastal watersheds**.** The plan prioritizes coastal watershed areas for conservation and offers regional strategies for maintaining diverse wildlife habitat, abundant wetlands, clean water, productive forests, and outstanding recreational opportunities into the future. The highest priority areas for conservation are based on the following important resources[58]:

- Large, unfragmented forest blocks
- Intact floodplains and riparian zones
- High quality stream networks and small watersheds
- Irreplaceable coast and estuarine features
- Significant fish and wildlife habitats
- Critical habitat supporting rare species and exemplary natural communities
- Important connectivity zones

The plan identifies Land Conservation Focus Areas, (different from the NH Wildlife Action Plan's Wildlife Habitat Conservation Focus Areas described in Section 11.3), considered to be of exceptional significance for the protection of living resources and water quality in the coastal watersheds including:

- Forest ecosystems
- Freshwater systems
- Irreplaceable coastal and estuarine resources
- Critical plant and wildlife habitat

Each Conservation Focus Area is comprised of a Core Area that contains the essential natural resources for which the focus area was identified, with the boundary fitted to the real world of roads, forest edges, rivers, and wetlands. The associated Supporting Landscapes are lands adjacent to Core Areas that provide valuable support functions to them.

[58] *The Land Conservation Plan for New Hampshire's Coastal Watersheds* (2007) p. 1-4.

Table 11-4: Barrington's Land Conservation Focus Areas

Area Designation	Acres	% Total Town Area
Core Focus Areas	5,679.3	18.3
Supporting Landscape	5,366.0	17.2
Total Combined Areas	11,045.3	35.5

[Source: The Land Conservation Plan for New Hampshire's Coastal Watersheds]

As shown on Map 7 (Areas of Ecological Significance), eight Core Focus Areas and Supporting Landscape Areas are identified, either partially or wholly located in Barrington. Together, the portions of these areas located within the Town boundaries comprise over 35 percent of the Town's total area. It should be noted that many of these identified areas extend into neighboring towns, making their protection an issue of regional as well as municipal importance.

The largest identified Focus Area is at Bumfagging Hill where the Core and Supporting Landscape amounts to over 3,300 acres or 10.5 percent of the Town's total area. Other areas having the largest Core are the Lower Isinglass River, Stonehouse Brook, and Creek Pond Marsh. The Lower, Middle and Upper Isinglass River areas combined total over 1,800 acres of Core area and nearly 1,600 acres of Supporting Landscape – a combined 3,400 acres or 11 percent of the Town's total area. All of the eight Focus Areas are parts of larger unfragmented forest blocks, and contain important headwater (first order) streams. Several areas contain high quality watersheds, wellhead protection areas, and important farmland soils. Additional details on the acreages of these areas can be found in Tables 12 and 13 of Appendix A.

11.5 Recommendations

11-1 Collaborate with neighboring towns on conservation and protection activities in those identified focus areas that extend beyond town boundaries.

11-2 Create and post trail markers or trailside tablets that describe the habitat types and their importance to wildlife, from the Wildlife Action Plan and Land Conservation Plan on town-owned lands and conserved properties with public access.

11-3 Update land use and zoning regulations to better protect these ecologically important areas. Consider developing a zoning overlay district for ecologically significant areas.

11-4 With professional biologists and volunteers, conduct "biothons" to identify and count different species in Core Focus Areas.

12.0 HISTORIC, CULTURAL, PUBLIC, AND RECREATIONAL RESOURCES

12.1 Overview

Barrington's 2001 Natural Resources Inventory considered historic, cultural and aesthetic aspects, as well as open space and recreational potential, to be important criteria in the evaluation of the Town's natural resource base. Most of the resources identified in that inventory were notable for their historic and scenic features - old mill sites, historic buildings, stonewalls, bridges and scenic views. Virtually all of the parcels identified also had existing or potential for recreational opportunities such as walking trails; water-related recreation including fishing, boating, swimming; as well as hunting and winter sports. When combined with the information provided in this document, the parcels identified in the 2001 inventory that have not yet protected can be evaluated and prioritized for conservation within a broader context of natural resource and habitat value.

12.2 Barrington's Historic, Cultural, Public and Recreational Resources

While it would be impossible to describe all of Barrington's important historic, cultural, public, and recreational resources, the overviews below provide a cross-section sampling of potential preservation and recreational opportunities.

Historic and Cultural Features

Barrington has a long and rich history that creates part of the fabric upon which current conservation efforts are based. Several excellent local histories are available from the Barrington Historical Society and/or the Barrington Library and Calef's Country Store. *A History of Barrington*, by Morton H. Wiggin; *Barrington New Hampshire 1722 – 1972*, by Mary Emhart and Louise Williams; *Graveyards of Barrington New Hampshire*; and *My Book of Barrington* for children are all good historical resources.

Barrington was made up of two grants [59], one encompassing all of Strafford and most of Barrington, and the second comprising the Two Mile Streak which was set aside to provide home sites for imported workers at the Lamprey Iron Works. The Town's charter was signed in 1722. In 1820, Strafford was separated and incorporated as its own town. Barrington was an ideal location for mills because of the abundant timber, as well as the many streams and rocky falls. Many old mill sites are still partially intact, including the Berry Mill on the Berry River at Second Crown Point Road. Locke Falls is a spectacular 25-foot waterfall and old mill site on twelve acres that has been protected by the Town.

In 1983, the Barrington Historical Society initiated a project to identify all homes in Town that were then at least 150 years old. The initial analysis showed that Barrington had about 130 of these old homes, several of which were probably built before the Revolutionary War. There were also five garrisons in Town, built to provide protection from Indian attacks.

[59] This discussion was taken from *A Little History of Barrington from the Town of Barrington Master Plan 1995*. Barrington Press at www.barringtonpress.com/history.php

Certain roads in Barrington have been designated under NH RSA 231:158 as Scenic Roads. These currently include Old Canaan Road, Canaan Back Road (also a designated Scenic Road in its Strafford portion), and Cooper Road. Old stone walls can be observed along many roads in Barrington, a common byproduct of early forest clearing for agriculture and animal husbandry.

Open Space

Open space includes many types of undeveloped lands such as forests, wetlands, riparian areas, wildlife corridors, meadows and agricultural lands. As described in previous sections of this inventory, Barrington has an extensive network of open spaces and undeveloped lands including large forest blocks, and valuable agricultural land. Many of these lands provide recreational opportunities such as walking, biking, bird watching, winter sports and hunting. These lands are also valuable outdoor laboratories and important natural resource and ecosystem research areas. Some of these lands are protected (see Section 13.2) and allow public access. Several parcels are owned by the Town including the Kids of the River property on Scruton Pond Road, and the Town Forest off of Route 202/9.

Trails

Trails provide abundant recreational and scenic resources. Hiking, biking, snowmobiling, cross-country skiing, and snowshoeing are popular outdoor activities. The Barrington Trails Committee built and/or maintains several trails including the "Kids of the River Club" Isinglass Walk along the Isinglass River, the Newhall Farm Trail, and The Barrington Trail. An informative guide to these and other trails along public and privately-owned lands, *Walking Trails of Barrington* written by James H. Schulz contains some trail maps, and describes eight walking tours while pointing out interesting historical facts, natural features and wildlife habitats that can be observed along the way. The booklet is available for purchase at Calef's Country Store.

Water-Related Recreation

The Isinglass River provides excellent fishing and some canoeing/kayaking opportunities. NH Fish & Game annually stocks the river with approximately 5,000 brook, brown, and rainbow trout. The river is considered an important trout stream by local anglers and is heavily utilized as such during May and June especially in the area near the junction of Routes 126 and 202. The river also provides both challenging whitewater and relaxing flat-water canoeing and kayaking opportunities. Published river guides rate the river as Class II whitewater. Less challenging stretches of the river provide paddlers with excellent wildlife and scenic viewing opportunities. [60]

Other streams in Barrington are fishable as well. Bumford Brook and Mallego Brook in particular provide good fishing opportunities and are home to native Brook Trout.

[60] *Isinglass River Management Plan* (2008). Strafford Regional Planning Commission for the Isinglass River Local Advisory Committee.

The numerous lakes and ponds in Barrington provide abundant water-related recreational opportunities. These resources are popular and receive increasing use and environmental pressure as population increases and lakefront development continues. Stonehouse Pond is a spectacular and popular fly-fishing site with state-owned public access for non-petroleum boats. Swain's Lake is heavily utilized by lakefront residents and the public alike. The lake has a public access boat launch, and is home to the Barrington Shores Campground with over 140 campsites, boat rentals and a boat dock. Swain's Lake is popular for fishing, having produced trophy-sized bass. The state does not allow personal watercraft on the lake.

On Ayers Lake, the Ayers Lake Farm Campground has 15 acres of camping area including at total of 51 cabin, tent, and RV sites. Canoes and boats are available for rent, and scenic walking and biking trails are available on the property. There is an unimproved, public car-top access boat ramp located near the outlet of the Lake. A private camp, Camp Fireside provides scheduled day and overnight group camp experiences on Ayer's Lake. Their private beach is open to local residents by application and payment of a seasonal fee.

Nippo Lake also has shore bank access for boating and fishing, but is otherwise inaccessible to the public. UNH owns a 200-acre outdoor recreation area at Mendums Pond. Fees are charged to access the area that contains picnic and swimming areas; and canoe, kayak and paddle boat rentals. Wildlife and scenic viewing opportunities are abundant, and fishing is good.

Public Events

The Barrington Natural Heritage Committee organizes Natural Heritage Days family celebration of Barrington's many natural treasures of lakes, forests, wildlife, wetlands, rivers and farmlands all a part of the Town's exquisite Natural Heritage of open space protected by conservation easements. These events often include live music, natural resources demonstrations and displays, booths selling locally grown and hand-crafted products, food concessions, and tours of the natural landscape.

Other Recreational Resources

Barrington Recreation Commission is part of the municipal government and works to provide recreational opportunities to Town residents. Organized sports such as soccer, basketball, indoor T-ball and floor hockey are very popular. Other programs include morning and evening fitness classes, summer camp, and a preschool discovery program. Nearly 3,800 people have participated in one or more of these programs. [61]

Barrington Youth Association is a non-profit, tax exempt organization affiliated with Babe Ruth Baseball, Babe Ruth Softball, ASA Softball, and Cal Ripken Baseball. The Barrington Youth Association was formed in 1972 by a group of persons interested in providing an organized baseball program for the youth of Barrington. Four teams were formed with boys and girls playing baseball. In a few years there were enough players to be able to split into baseball and softball. With the cooperation of many volunteers, donors and sponsors, the BYA has grown to

[61] Barrington Recreation Department Operating FAQs 2009 at http://www.barrington.nh.gov/Portals/22/Rec/docs/Rec_FAQ_2009.pdf

forty teams that play at a complex on Smoke Street that has 2 T-ball fields, 4 fields for 7-12 year-old baseball/softball, 1 Babe Ruth field, pitching machines and batting cage; a 2-story building with full concession and a meeting room upstairs; equipment building with restrooms and separate equipment lockers; 3 large parking lots and 3 electric scoreboards. As of the end of 2000 all of the fields have automatic watering systems. In 2005, the BYA welcomed youth from the Town of Strafford into the program. Teams from ages 8-15 are integrated with players from both towns. There were 431 players who participated in the program in 2005. [62]

Barrington Snow Goers club publishes a snowmobile trail map. Primary club maintained trails enter Barrington from Northwood near North River Lake and head southeast skirting Stonehouse Pond, crossing Swains Lake, and into the Town of Lee along Tibbetts Road. Near Swains Lake, the main trail branches east then south, and splits into two trails. One continues south along Province Road and heads toward the Bellamy Reservoir in Madbury and connecting trails in Lee. The other trail turns east, crosses behind Calef's store then heads north along Route 125 nearly to Scruton Pond Road where the trail then crosses Route 125 and heads south to the Bellamy Reservoir and trails in Madbury and Lee.

Major Waldron's Sportsman's Association is a membership-based organization in existence since 1931. The club is situated on 200 acres, and features a 300-yard outdoor shooting range, skeet and trap ranges, sporting clays and an indoor range. Educational and safety courses are conducted on shooting, hunting, fishing, archery, and wildlife conservation.

Nippo Lake Golf Course is a public 18-hole golf course located on Province Road near Route 126. Breathtaking views and wildlife abound at this hilltop location. A full service restaurant and pub also have live music events. Golf lessons for all abilities are also available.

12.3 Recommendations

12-1 Develop a town-wide trails and recreational access map, and make it available to the public in several formats (print, online, etc.). Describe what recreational opportunities are and are not allowed on different lands.

12-2 Evaluate potential locations and mechanisms to acquire free, public beach access for swimming on at least one of the Town's lakes or ponds.

12-3 Organize more community-wide events that provide outdoor opportunities for Town residents to explore and learn about walking trails, local landmarks, and special places of historic, cultural, and natural or scenic value.

12-4 Consider designating additional roads or segments as Scenic Roads (e.g., Province Road near Nippo Golf Course).

[62] Barrington Youth Association website at http://www.leaguelineup.com/miscinfo.asp?menuid=30&cmenuid=30&url=byanh&sid=814253535

13.0 RESOURCE CONSERVATION AND PROTECTION

13.1 Overview

There are several ways to conserve and protect valuable natural resources and ecosystems. The primary mechanisms for conserving land are through zoning regulation, tax methods, direct acquisition, or the assignment of protective conservation easements on parcels. In the case of conservation easements, governments, land trusts, non-profit preservation groups, and landowners work cooperatively to develop parcel-specific conservation easements that provide ongoing benefit to the landowner while specifically limiting certain activities and mandating oversight and monitoring, to ensure that the parcel is protected in perpetuity.

At the municipal level, conservation subdivision zoning (see Section 2.0) encourages the preservation of open spaces while allowing appropriate development to occur in suitable locations. Conservation easements are commonly placed on a portion of the subdivision's property.

Current use property assessments are another key method of conserving lands. The current use program encourages landowners to keep larger parcels intact and productive for agriculture and forestry, or left unused as wild land, by lowering their property tax burden for as long as the land remains under its traditional use. Some towns set aside a percentage of revenues from current use tax assessments to acquire lands outright or to provide matching funds or administrative support for conservation easement activities. In Barrington, 50 percent of the current use property assessment revenue is used for land conservation and protection. In 2006, that amount totaled over $150,000 from over 500 parcels comprising over 12,000 acres of land, or nearly 40 percent of the Town's total area. The majority of the land in current use is in forest, while only 511 acres or about 4 percent is currently in agriculture use.

Table 13-1: Barrington's Current Use Program

Current Use Designation	Acres	% of Current Use Lands	% Total Town Area
Farmland	668.05	5.24	2.15
Forest Land without Stewardship	7,558.34	59.26	24.29
Forest Land with documented Stewardship (e.g. tree farm or forest management plan)	2,878.96	22.57	9.25
Unproductive Land	843.22	6.61	2.70
Wetland	805.03	6.31	2.59
Total	**12,753.60**	**99.99**	**40.98**

[Source: Town of Barrington, 2009]

Towns may also occasionally authorize the appropriation of specific funds to support land conservation. In 2004, Barrington voters approved an authorization issue bonds of $800,000 for the permanent protection of undeveloped land. The Town has developed a *Statement of Purpose and Guiding Principles for the Acquisition of Land and Conservation Easements*. The Town's goal is to conserve and permanently protect unique and increasingly rare parcels of undeveloped land for current and future generations of residents. The Selectmen, Conservation Commission, and Natural Heritage Committee work to identify undeveloped parcels of land whose protection and conservation are most critical to maintaining the natural heritage of the community.[63] The Town has also developed a comprehensive set of criteria for evaluating which lands qualify for protection utilizing these public funds.[64] The final decision on specific property purchases for conservation is made by the Select Board.

13.2 Protected Lands

There are currently 48 parcels with some level of conservation protection in Barrington. Combined, these lands total over 3,400 acres or 11 percent of the Town's area, as detailed in Table 14 in Appendix A. Some of these parcels were identified in the 2001 Natural Resources Inventory and have been subsequently protected.

The largest conserved area in Town is the Barrington Headwaters Reserve (Tamposi or SATWaSR lands) comprising 1,378 acres (see Section 7.7) or approximately 4.4 percent of the Town's total area, under a conservation easement held by The Society for the Protection of New Hampshire Forests (SPNHF) on behalf of the town. SPNHF also holds an easement on the 64-acre Jeffery parcel on France Road. The Warren Farm, located off Route 4 and abutting the Tamposi parcel, has a large conservation easement covering 244 acres. This property is also a registered Tree Farm. Other conservation easements range in size from about 3acres to nearly 150 acres. Some of these conserved lands are associated with conservation subdivisions.

Barrington Conservation Commission and Natural Heritage Committee have established the goal of protecting 10% of the Town's land from development by 2010 and 15% by 2030. The initial conservation goal has already been exceeded, and several additional properties are currently moving along toward permanent protection. However, Barrington's overall level of land conservation is rather low relative to other towns in the region, with only about 11 percent of the Town's total area currently protected, the vast majority of that in the SATWaSR Reserve parcels.

[63] Barrington Conservation Commission website at http://www.barrington.nh.gov/LinkClick.aspx?fileticket=TwgqmI0J8GA%3d&tabid=1229&mid=2564

[64] *Selection Criteria for Land and Conservation Easement Acquisitions* (September 19, 2005). Barrington Conservation Commission and Natural Heritage Committee. http://www.barrington.nh.gov/LinkClick.aspx?fileticket=0ZJBAspWbXM%3d&tabid=1229&mid=2564

13.3 Future Conservation Priorities

As described in Section 11.0 and on Map 7 (Areas of Ecological Significance), several areas with a high conservation priority have been identified by the NH Wildlife Action Plan and the Land Conservation Plan for Coastal NH Watersheds. In addition, Barrington's 2001 Natural Resources Inventory identified numerous locations having one or more important natural resource characteristics, based on local knowledge of these areas. These three sources of information, along with this inventory's GIS-based data and Map Set, can be evaluated in combination in order to focus future conservation efforts on the most critically important lands and resources. Once fully analyzed, these parcels can be evaluated for appropriate conservation strategies and then prioritized for implementation of protective measures in conjunction with willing landowners.

13.4 Stewardship and Education

Public education, outreach, and stewardship are key elements to the successful protection and ongoing preservation of important natural resources. Barrington has an active and committed network of municipal, regional, and volunteer organizations and partnerships that have worked tirelessly to promote and implement environmental stewardship and resource protection measures. However, as population and development pressures increase, it will become increasingly important to educate and build consensus among landowners, voters, and decision-makers on natural resource protection priorities and options. Collaboration with other local and regional organizations (see Section 14.0) can contribute to greater efficiencies, a larger knowledge base, and leveraging of limited financial resources toward the most important projects.

Landowner education is a critical element of effective and sustainable environmental stewardship. Public outreach, local events such as the Natural Heritage Days, and dissemination of natural resource information to property owners can encourage them to consider how their actions impact the environment and the Town's natural resource base.

School curriculums that focus on local natural resources can be a highly effective way to encourage students (and hence their families) to gain a greater appreciation for the importance of stewardship. Providing hands-on opportunities for students to learn about natural resources is a powerful way to generate student enthusiasm for conservation. The Kids of the River project was a highly successful middle school age program that resulted in students testifying before the NH Legislative Committee in support of the Isinglass River designation as a NH Protected River. Kids of the River were also responsible for creating the picnic area and short trails now part of the Isinglass River Walk.

13.6 Recommendations

13-1 Develop stewardship plans for all Town-owned and, working with landowners, develop stewardship plans for all lands for which the Town holds a legal interest in a conservation easement. Encourage other landowners who have conservation easements to develop stewardship plans.

13-2 Consider hiring a land steward to monitor conservation and Town-owned lands (see also recommendation 5-5).

13-3 Develop and make widely available, landowner materials related to preservation and protection of resources, and municipal and state regulation of those resources. Develop a marketing plan to ensure that such materials result in practices that meet conservation goals.

13-4 Continue to seek partnering opportunities with other public and private organizations to build capacity for natural resource conservation. Leverage volunteer resources along with public and private representatives to bring conservation education and information resources to the public without significant costs to participants or taxpayers.

13-5 Work with the school district to develop local environmental curriculums, and provide increased opportunities for student and youth participation, including after-school programs in natural resource conservation projects.

14.0 PARTNERS IN RESOURCE CONSERVATION

14.1 Local and Regional Organizations

Isinglass River Local Advisory Committee

Formed in 2000, the Isinglass River Protection Project (IRPP) was composed of a handful of local citizens who organized a strong network of support through educational outreach programs, petitions, and public meetings. The IRPP and Barrington's Kids of the River led efforts to nominate the Isinglass River as a protected river under the NH Rivers Management and Protection Program, a goal that was achieved in 2002. The nomination showcased the river's values and importance to local communities as an important environmental, historic, and recreational resource. Many of the IRPP's members eventually became members of the Isinglass River Local Advisory Committee (IRLAC), which actively supports protection of the river and its watershed by reviewing development projects, conducting educational and outreach activities, and participation in public meetings and events in each of the three river corridor communities – Strafford, Barrington, and Rochester.

In June 2008, IRLAC completed the Isinglass River Management Plan, which was distributed to elected officials, land use boards, conservation commissions, and libraries in the watershed communities, and to other watershed partners and stakeholders. The Plan recommends specific actions to protect the river corridor and the watershed, and advocates for participation of all watershed communities to implement Plan goals. The completed River Management Plan is available on the Strafford Regional Planning Commission website at www.strafford.org.

Bellamy and Oyster Rivers Watershed Protection Partnership

The Bellamy and Oyster Rivers Watershed Protection Partnership (BORWPP) was formed to promote the protection of the Bellamy and Oyster River watersheds for the benefit of present and future generations through coordinated, inter-municipal, natural resource management and education. BORWPP acts as a partnership of designated municipal representatives and interested individuals to evaluate watershed issues and advise municipal officials, boards, commissions, and state agencies regarding the proper utilization of the surface water and groundwater resources of the Bellamy and Oyster River Watersheds. BORWPP seeks to further public awareness of natural resource protection and conservation policies, and water utilization practices that may impact the Bellamy and Oyster River watersheds.[65]

Oyster River Watershed Association

The Oyster River Watershed Association (ORWA) was formed in 1999 by local citizens concerned about the health and preservation of natural resources in this relatively pristine watershed. The ORWA is staffed entirely by volunteers, whose interests include land protection, water quality, wildlife habitat, recreation, education, and history. Its mission is to protect,

[65] From the BORWPP website at http://www.borwpp.lefh.org/www/borwpp/html/about_borwpp.html

promote, and enhance the ecological integrity and environmental quality of the Oyster River watershed, through land protection and education.[66]

Lamprey River Watershed Association

The Lamprey River Watershed Association (LRWA) was formed in 1980 to promote the restoration, conservation, wise development and use of the natural resources of the Lamprey River Watershed. Conserving fish and wildlife, forests, soil and water resources along with pollution abatement are key goals of the Association. Through education and research, the LRWA will work to increase the understanding among citizens about the importance of water and land conservation in the watershed. The group works in partnership with other conservation organizations and citizen groups to maintain or improve the natural health and beauty of the watershed.[67]

Lake Associations

The Swains Lake Association was formed in 1975 for the purposes of:

- Acquiring and fixing the dam and to protect the lake;
- Improving and maintaining water quality of the lake for all users;
- Developing a strong, recognized organization to represent the interests and needs of lake residents;
- Promoting involvement and input from all watershed residents, interested persons; and organizations through communication, action, and education.

The Association conducts educational and outreach activities: Swains Lake Association Newsletter, Weed Watcher Program, water quality monitoring, and Lake Host Program. The Association has recognized several ways in which land development has and potentially could adversely impact water quality, habitat, and property values at Swains Lake:

- Over the past ten years, documented annual reductions in water quality
- Removal of lakeside vegetation and establishment of greater areas of lawn
- Proximity of roads and development that generates runoff to the lake
- Steep slopes and sandy soils adjacent to the lake
- Nutrient contributions from runoff, septic systems, and fertilizers[68]

There are several other local lake-related associations in Barrington including the Nippo Lake Association, North River Lake Volunteer Monitors, and four road associations around Mendums Pond including Holiday Shores, Mendums Landing and McDaniel Shore.

Cocheco River Watershed Coalition

The Cocheco River Watershed Coalition (CRWC) - a non-profit advocacy group - was founded in 1998 to maintain a healthy watershed by identifying and protecting important natural resources, by forming a water quality monitoring network, and by educating and engaging

[66] From the ORWA website at http://www.volunteersolutions.org/uwgs/org/218104.html
[67] From the LRWA website at http://www.lrwa-nh.org
[68] From the Swains Lake Association website at http://www.swainslake.com

citizens in these efforts. The Coalition has completed several comprehensive studies of the watershed including *Cocheco River Watershed Environmental Quality Report (*February 2005) and The *Watershed Restoration and Implementation Plan for the Cocheco River*. This plan recommends a working partnership of communities in the watershed to achieve the primary goals of the Plan to:

- Improve public perception and understanding about the value of the river and increase stewardship for and responsibility to the river.
- Restore water quality for greater recreational opportunities (swimming, boating, fishing), particularly upstream waters that discharge to the tidal portion of the river and the Great Bay estuary.
- Restore wildlife and habitat by improving the condition of riparian areas, channel stability, and instream conditions.
- Protect infrastructure and water quality by supporting low impact development, reduction in impervious surface cover, and reduction in sediment and other pollutants in runoff.

In 2008, the CRWC submitted a nomination for designation of the Cocheco River to the New Hampshire Rivers Management and Protection Program, for review and consideration as a NH Protected River.

Land Trusts

The Strafford Rivers Conservancy (SRC) is a non-profit regional land trust whose purpose is to protect the natural resources, beauty, and character of lands in Strafford County. The SRC achieves its mission through the promotion of conservation easements, education, and the acquisition and stewardship of land. The Strafford Rivers Conservancy works closely with all sectors of the community including public agencies, private landowners, businesses and other non-profit organizations, and assists to private landowners and others who are interested in land conservation. The SRC holds many easements, which must be monitored, inspected, and enforced. The SRC educates landowners on procedures for protecting their land through conservation easements or outright gifts of land; and provides guidance throughout the process. In addition, the SRC works with developers to create development plans that are both environmentally sensitive and economically viable. SRC presently holds conservation easements on seven Barrington properties.

The Society for the Protection of New Hampshire Forests (SPNHF) is one of the country's most effective statewide land conservation organizations. As a non-profit membership organization, the Forest Society is dedicated to protecting the state's most important landscapes while promoting the wise use of its renewable natural resources. Accomplishments include:

- Helping to protect over one million acres of open space in the state
- Effectively promoting good land stewardship, through education and by example
- Advocating for public policies that encourage the wise conservation of natural resources[69]

SPNHF presently holds conservation easements on three properties in Barrington.

[69] From the SPNHF website at http://www.forestsociety.org/aboutus/

14.2 Federal and State Agencies and Programs

UNH Cooperative Extension

The mission of the University of New Hampshire Cooperative Extension is to "*provide New Hampshire citizens with research-based education and information, enhancing their ability to make informed decisions that strengthen youth, families and communities, sustain natural resources, and improve the economy.*" This cooperative effort ensures all people have local access to their state university and the knowledge and resources available to address needs and problems. The principal partner is the University of New Hampshire. As a state land-grant university, it is charged by Congress to conduct resident instruction, research, and outreach to people beyond the classroom.[70]

The Cooperative Extension has an office in Dover, and offers communities many valuable resources and programs. Technical guidance, assistance with natural resource and wildlife management issues, landowner and public education initiatives such as workshops and training are available to residents and municipal officials.

Strafford County Conservation District

The Strafford County Conservation District is organized and operated under RSA. 432. The mission of the Conservation District is the conservation and development of soil, water, and related natural resources; the prevention of soil erosion; plus the prevention of floodwater damages. The Conservation District facilitates the joint efforts of landowners, land occupiers, and units of governments in carrying out measures for the conservation and environmentally sound development of lands within Strafford County. The goal of the Conservation District is to ensure the use of every acre of land within Strafford County consistent with its inherent capabilities; and the treatment of every acre in accordance with its needs for protection, both present and in the future. This office receives in-kind rental space from Strafford County.[71]

Natural Resource Conservation Service

The Natural Resources Conservation Service (NRCS) is the lead conservation agency in the U.S. Department of Agriculture. We are a technical agency that provides trained soil conservationists, technicians, soil scientists, agronomists, engineers, economists, biologists, foresters and other experts to help landowners and land users with conservation. This is accomplished through conservation problem solving, collecting and assessing natural resources data, and providing natural resource information and education. NRCS relies on partners to help set conservation goals, work with people on the land, and provide services. Partners include conservation districts, local, state and federal agencies, and agricultural and environmental groups. The local conservation delivery system is a growing partnership. [72]

[70] From the University of New Hampshire Cooperative Extension website at http://extension.unh.edu/
[71] From the Strafford County website at http://www.co.strafford.nh.us/County_resources.aspx
[72] From the USDA NRCS NH website at http://www.nh.nrcs.usda.gov/about/

NH Department of Environmental Services

The various programs of the DES provide technical assistance and funding opportunities for nearly every sector of natural resource protection and management from drinking water supply protection to non-point source pollution abatement to land conservation. However, it is necessary to become familiar with each program and the resources that are available to determine appropriate partnerships and achieve results in implementing the recommendations of this Natural Resources Inventory.

Strafford Regional Planning Commission

Strafford Regional Planning Commission's (SRPC) fundamental mission is to plan and act to achieve sustainable development and improve the quality of life. Sustainable development is balanced economic progress with environmental protection and community well being.

SRPC has been active in regional planning for over 40 years as one of the nine Regional Planning Commissions established by the New Hampshire legislature. SRPC is composed of eighteen communities including all thirteen municipalities in Strafford County, three communities in Rockingham County, and two communities in Carroll County. Operating as a political subdivision of the State, SRPC serves an advisory role to local governments and organizations. SRPC works to improve the region by coordinating local planning, promoting orderly growth and efficient land use and transportation systems, and addressing issues of regional concern. SRPC's professional planning staff assists in land use, transportation, environmental planning, economic development, support services, and project management.[73]

14.3 Recommendations

14-1 Identify natural resource partners that are already active in the region encompassing Barrington and surrounding towns. Seek additional opportunities to collaborate with regional partners to support the goals of Barrington's Natural Resources Inventory. Collaborate with local volunteer groups already working across town boundaries such as the Bellamy Oyster River Watershed Protection Partnership and the Isinglass River Local Advisory Committee.

14-2 Collaborate with existing public technical assistance resources to identify natural resource projects and programs of mutual benefit (e.g., UNH staff and academic investigations as part of UNH research and curriculums that could take place in Barrington).

14-3 Investigate DES technical support and partnering opportunities.

14-4 Identify grant funding opportunities to implement specific projects and programs that support conservation goals.

[73] From the SRPC website at http://www.strafford.org/about/about.htm

15.0 SUMMARY AND RECOMMENDATIONS

15.1 Summary

Barrington is very fortunate to have an abundance and wide variety of natural resources. Given the Town's location in the fast-growing seacoast region of New Hampshire, development can be expected to place increasing pressures on the Town and its natural resource base. As described throughout this Natural Resources Inventory, there are many natural resources, special habitats and ecosystems that are valuable and worthy of further consideration for further study, preservation and/or active management.

Current zoning ordinances and land use regulations provide some protections. However, the Town can take several additional approaches to maintain and protect its rural character, and its special resources for the benefit of current residents, visitors, wildlife, and future generations.

15.2 Recommendations

Recommendations listed at the end of each Section of this Natural Resources Inventory were developed to assist the Town in its conservation strategic planning efforts. All of the recommendations have been consolidated in the table below. They can be broadly categorized as follows:

- Zoning, Regulation and Planning
- Additional Study and Field Work
- Education and Outreach
- Stewardship
- Regional Partnership Activities

It is hoped that the Barrington NRI Work Group will:

- Categorize and prioritize these recommendations
- Set timelines for their implementation
- Collaborate with other partners as appropriate
- Track the progress made toward meeting the NRI and Town's conservation goals

Table 15-1: Summary of Recommendations	
NRI Section and ID #	**Recommendation**
1-1	Review and update this Natural Resources Inventory every three to five years as the Town's priorities change and new information becomes available.
2-1	Finalize the amended Zoning Ordinance and Zoning Map, and update the Town's Land Use webpage with the most current zoning documents (The March Town Meeting 2008 version of the zoning ordinance is on the Planning Board webpage, but the map is not on the website at all).
2-2	Update the Town's subdivision regulations relating to conservation subdivisions in order to better reflect the primacy of conservation values to the Town.
3-1	Expand Zoning Ordinances to restrict steep slope development on non-residential sites.
3-2	Seek municipal official training in Visual Resource Analysis, conduct visual resources inventory and evaluate if additional zoning regulations are warranted. See http://www.blm.gov/nstc/VRM/vrmsys.html
4-1	Ensure that new development proposals are evaluated for potential impacts to important farmland and forest soils.
4-2	Develop incentives to encourage active agricultural activities, and to protect farmlands not currently in use.
4-3	Reuse sand and gravel excavation sites as habitat restoration and low-impact, non motorized recreation.
4-4	Consider creating a new zoning district for rural, agriculture, and forest lands.
5-1	Consider adding minimum tree coverage/canopy requirements to commercial and village district zoning.
5-2	Encourage volunteer and school-based efforts to identify NH big trees.
	Work with Tree Farm property owners on public outreach and education about this valuable resource – not many people understand what a tree farm is, and its value.
5-3	Celebrate Arbor Day in Barrington.
5-4	Train and hire a land steward for SATWaSR land in conjunction with SPNHF, and for other town-owned lands and town-held easements.
6-1	Develop a comprehensive program for inventory of locally observed species, including invasive species on town-owned and conserved lands. Consolidate existing data on species from sources such as UNH's work at the Tamposi land, the Land Conservation Plan, NH F&G, Barrington Trails Committee, NH Natural Heritage Program, NH Audubon, etc.
6-2	Encourage schools, students and volunteers to participate in the NH Fish &Game Reptile and Amphibian Reporting Program (RAARP).
6-3	Provide educational information to educate landowners about planting native species and controlling invasive species.
6-4	Organize volunteer groups to remove invasive species from roadsides and town-owned lands.
6-5	Provide educational information for boat ramps, property owners, and fishermen about aquatic invasives (e.g., Weed Watcher and Lake Host programs) on waterbodies without these programs in place.

Table continued next page

Table 15-1: Summary of Recommendations	
NRI Section and ID #	**Recommendation**
7-1	Provide information about, and encourage participation of town residents in voluntary water quality monitoring, and lake and stream assessment activities to protect water quality.
7-2	Educate landowners about practices they can implement to protect water quality, including septic system maintenance, lakeside and streamside landscaping, alternatives to the use of fertilizers near water bodies, invasive species, and erosion control measures.
7-3	Develop lake inventories using *The New Hampshire Guidelines for Coordinated Lake Management and Shoreland Protection Plans and The New Hampshire Comprehensive Lake Inventory* (July 2008) NH Department of Environmental Services at http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/nhdes-wd-08-8.pdf
7-4	Provide education and information at the Town Offices, the Library, at Town Meetings, in workshops, tours, and at other events in the form of handouts, factsheets and resource materials regarding specific water quality and water protection issues.
7-5	Work with UNH and partner agencies to develop and make available to Town officials and the public, watershed maps for each of the major waterbodies in Barrington.
7-6	Update the Town's Zoning Ordinance and Zoning Map to reflect amended NH Shoreland Protection Act setbacks and buffers around affected public waters.
7-7	Support nomination of Oyster River to NH Rivers Protection Program.
7-8	Support implementation activities of the Isinglass River Management Plan.
7-9	Support active stewardship of SATWASR, or organize a volunteer group to monitor and steward the SATWaSR property (see also recommendations 5-4 and 13-1).
8-1	Coordinate with surrounding towns such as Madbury, Lee, Durham and Dover to review the Groundwater Sustainability in the Seacoast Region study (due to be published in 2009) for local planning for future water supply contingencies in case of emergencies and shortages.
8-2	Review the forthcoming report, Land Use and Groundwater Quantity Management Document for Communities DES (due in 2009) and evaluate options for additional groundwater protection and management for the Town.
8-3	Conduct more detailed studies of aquifers in Barrington for potential future municipal water supply identification.
8-4	Provide information to private well owners about the potential for arsenic and uranium in drinking water, and encourage the testing of private wells.
8-5	Provide education and information to the public on the importance of protecting groundwater resources. Work with students/schools to develop groundwater and drinking water projects and curriculum.
9-1	Revise zoning ordinance language to exclude Hydric B soils from the minimum required upland area for a new lot.
9-2	Inventory vernal pools on town-owned and conservation lands, and locate groups of nearby vernal pools that form larger habitats for amphibians and turtles.
9-3	Encourage volunteer participation in NH F&G's Reptiles and Amphibians Reporting Program – especially with students/schools.

Table continued next page

Table 15-1: Summary of Recommendations	
NRI Section and ID #	**Recommendation**
9-4	Identify wetland areas in Town that may be suitable for the DES in lieu fee program for re-creation, restoration, and preservation, such as properties adjacent to SATWaSR
9-5	Update the Town's prime wetlands inventory with additional field verification. Revise prime wetlands maps as required.
10-1	Provide information and education to landowners about the importance of protecting water resources and practices they can implement to minimizing non point source pollution including septic system maintenance, erosion control, maintaining vegetated riparian buffers, and minimizing impervious surfaces (see also recommendation 7-2).
10-2	Work with DES, Strafford Regional Planning Commission and the UNH Stormwater Center to develop best management practices for control of non-point pollution and stormwater management and treatment. These resources should be evaluated for possible inclusion in zoning ordinances, land use regulations and decision-making regarding stormwater impacts from development. See also publications from DES including the NH Stormwater Manual, Stormwater Management and Erosion and Sediment Control for Urban and Developing Areas in NH; and Best Management Practice for Urban Stormwater Runoff.
11-1	Collaborate with neighboring towns on conservation and protection activities in those identified focus areas that extend beyond town boundaries.
11-2	Create and post trail markers or trailside tablets that describe the habitat types and their importance to wildlife, from the Wildlife Action Plan and Land Conservation Plan on town-owned lands and conserved properties with public access.
11-3	Update land use and zoning regulations to better protect these ecologically important areas. Consider developing a zoning overlay district for ecologically significant areas.
11-4	With professional biologists and volunteers, conduct "biothons" to identify and count different species in Core Focus Areas.
12-1	Develop a town-wide trails and recreational access map, and make it available to the public in several formats (print, online, etc.). Describe what recreational opportunities are and are not allowed on different lands.
12-2	Evaluate potential locations and mechanisms to acquire free, public beach access for swimming on at least one of the Town's lakes or ponds.
12-3	Organize more community-wide events that provide outdoor opportunities for Town residents to explore and learn about walking trails, local landmarks, and special places of historic, cultural, and natural or scenic value.
12-4	Consider designating additional roads or segments as Scenic Roads (e.g., Province Road near Nippo Golf Course).
13-1	Develop stewardship plans for all Town-owned and, working with landowners, develop stewardship plans for all lands for which the Town holds a legal interest in a conservation easement. Encourage other landowners who have conservation easements to develop stewardship plans (see also recommendations 5-4 and 7-9).
13-3	Develop and make widely available, landowner materials related to preservation and protection of resources, and municipal and state regulation of those resources. Develop a marketing plan to ensure that such materials result in practices that meet conservation goals.

Table continued next page

Table 15-1: Summary of Recommendations	
NRI Section and ID #	**Recommendation**
13-4	Continue to seek partnering opportunities with other public and private organizations to build capacity for natural resource conservation. Leverage volunteer resources along with public and private representatives to bring conservation education and information resources to the public without significant costs to participants or taxpayers.
13-5	Work with the school district to develop local environmental curriculums, and provide increased opportunities for student and youth participation, including after-school programs in natural resource conservation projects.
14-1	Identify natural resource partners that are already active in the region encompassing Barrington and surrounding towns. Seek additional opportunities to collaborate with regional partners to support the goals of Barrington's Natural Resources Inventory. Collaborate with local volunteer groups already working across town boundaries such as the Bellamy Oyster River Watershed Protection Partnership and the Isinglass River Local Advisory Committee.
14-2	Collaborate with existing public technical assistance resources to identify natural resource projects and programs of mutual benefit (e.g., UNH staff and academic investigations as part of UNH research and curriculums that could take place in Barrington).
14-3	Investigate DES technical support and partnering opportunities.
14-4	Identify grant funding opportunities to implement specific projects and programs that support conservation goals.

16.0 APPENDICES

Appendix A - Natural Resource Data Tables not included in Sections 1.0 – 15.0

Appendix B - Regulatory Protection of Natural Resources (zoning ordinance excerpt)

APPENDIX A

Natural Resource Data Tables

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Table 1: Land Use Detail

Land Use Type	Acreage	% of Total Town Area
Multi-family medium to high-rise apartments	4.14	0.01
Multi-family low-rise apartments/townhouses	7.91	0.03
Single Family/Duplex	3,424.49	11.01
Mobile Home Parks	102.50	0.33
Group or Transient Quarters	1.00	< 0.01
Commercial Retail	45.81	0.15
Commercial Services	80.22	0.26
Other Commercial, Services, and Institutional	4.16	0.01
Office Park	2.15	0.01
Other Industrial Complexes	6.07	0.02
Other Commercial Complexes	3.15	0.01
Government	8.69	0.03
Institutional	3.23	0.01
Educational	22.15	0.07
Mining	55.13	0.18
		0.00
Road Right-of-Way	311.54	1.00
Park & Ride Lot	2.06	0.01
Parking Structure/Lot	2.69	0.01
Auxillary Transportation	7.23	0.02
Electric, Gas, and Other Utilities	133.43	0.43
Solid Waste Utilities	90.03	0.29
Outdoor Recreation	136.24	0.44
Cemeteries	15.31	0.05
Vacant Land	4.91	0.02
Agricultural Land	686.35	2.21
Other Agricultural Land	10.30	0.03
Brush or Transitional Land	6.57	0.02
Forested Land	20,580.62	66.14
Disturbed Land	135.19	0.43
Other Barren Land	103.17	0.33
Water	1,434.55	4.61
Wetlands	3,686.28	11.85
Total Town Area	**31,117.3**	**100%**

[Source: Strafford Metropolitan Planning Organization (2007)]

Table 2: Important Forest Soils

Forest Soil Group	Description	Acres	% Total Town Area
IA	Deeper, loamy soils, moderately to well-drained (northern hardwood forest type)	5,462.5	17.6
IB	Sandy or loamy soils, moderately to well-drained (mixed hardwood forest type)	13,326.3	42.8
IC	Outwash sands and gravels (pine forest type)	2,815.6	9.0
IIA	IA and IB soils with limitations such as steepness, shallow bedrock or rocky conditions	2,790.0	9.0
IIB	Poorly and very poorly drained soils (Hydric A and B)	2,555.3	8.2
NC/ Not Classified	Muck and peat, rock outcrop, gravel pits, marsh, open water, etc.	4127.7	13.3
Total Town Area		**31,076.6**	**99.9**

[Source: NRCS Strafford County Soil Survey, 1973]

Table 3: Inventory of Big (Champion) Trees

Species	Latin Name	CBH* (inches)	Height (feet)	Status	Year	Condition
Northern Catalpa	Catalpa speciosa	108	69	County	1998	Good
Eastern Hemlock	Tsuga Canadensis	136	78	County	1984	Good
Shagbark Hickory	Carya ovata var. ovata	134	104	State	2007	Excellent
Black Locust	Robinia pseudoacacia	186	93	State	1991	Good
Black Oak	Quercas velutina	139	64	County	1988	Good
Eastern White Pine	Pinus strobus	169	90	County	2007	Good
Ponderosa Pine	Pinus ponderosa	58	60	State	2007	Good
Sassafras	Sassafras albidum	100	64	County	1993	Excellent
Red Spruce	Picea rubens	112	82	State	1987	Good
Tamarack	Larix laricina	95	80	State	1984	Good
Black Walnut	Juglans nigra	101	64	County	1984	Good

[Source: State and County Listing of NH Big Trees]

* CBH = circumference at breast height

Table 4: Known occurrences of rare species and exemplary natural communities completely or partially within the town of Barrington. Blue highlighted species are associated with and/or dependent on wetlands and green highlighted species are associated with riparian/river banks.

Species Name	Listing Status		Rank	Precision	Last Reported
	Fed.	St.			
Plant Community					
Atlantic white cedar - yellow birch - pepperbush swamp	--	--	C	S	1990
Black gum - red maple basin swamp	--	--	H	S	1972
Red oak - ironwood - Pennsylvania sedge woodland	--	--	H	S	1985
Rich mesic forest	--	--	A	S	1999
Rich red oak rocky woods	--	--	C	S	1990
Plant Species					
American Plum (*Prunus americana*)	--	E	H	M	1957
Climbing Hempweed (*Mikania scandens*)	--	T	H	S	1988
Dwarf Huckleberry (*Gaylussacia dumosa*)	--	T	H	S	1962
Engelmann's Quillwort (*Isoetes engelmannii*)	--	E	H	M	1946
Ginseng (*Panax quinquefolius*)	--	T	C-D	S	1990
Large Yellow Lady's Slipper (*Cypripedium parviflorum var. pubescens*)	--	T	NR	S	1999
Ovoid Spike-rush (*Eleocharis ovata*)	--	T	H	M	1950
Prostrate Tick Trefoil (*Desmodium rotundifolium*)	--	T	H	M	1965
Reversed Bladderwort (*Utricularia resupinata*)	--	T	H	M	1971
River Bank Quillwort (*Isoetes riparia*)	--	E	H	M	1941
River Birch (*Betula nigra*)	--	T	H	M	1986
Small Whorled Pogonia (*Isotria medeoloides*)	T	T	H	S	1986
Water Marigold (*Megalodonta beckii*)	--	E	H	M	1939
Wild Lupine (*Lupinus perennis*)	--	T	H	M	1950
Animal Species					
Blanding's Turtle (*Emydoidea blandingii*)	--	--	NR	S	2005
Spotted Turtle (*Clemmys guttata*)	--	--	NR	M	2003
Wood Turtle (*Glyptemys insculpta*)	--	--	NR	S	2002
Common Loon (*Gavia immer*)	--	T	NR	S	2002
Great Blue Heron (Rookery) (*Ardea herodias*)	--	T	NR	S	2005
Banded Sunfish (*Enneacanthus obesus*)	--	--	NR	S	2005
Bridled Shiner (*Notropis bifrenatus*)	--	--	NR	S	2005
Swamp Darter (*Etheostoma fusiforme*)	--	--	NR	S	2005
New England Cottontail (*Sylvilagus transitionalis*)	--	--	NR	S	2002

[Source: NH Natural Heritage Bureau, August 12, 2008]

Key:

Listing Status
T = Threatened
E = Endangered
M = Monitored

Rank
A-D = Excellent (A) to poor (D)
H = Historical (last seen > 20 yr.
X = Extirpated
NR = Not Ranked

Precision
S = Location known to within 300 feet
M = Location known to within 1.5 mile
G = Location known only to place name

Table 5: Species list for SATWaSR
Partial list from R. Eckert

Insects

Odonates (Dragonflies and damselflies)

- Dragonflies
  - Dragonhunter
  - Fawn Darner
  - Common Green Darner
  - White Corporal
  - Four-Spotted Skimmer
  - Twelve-Spotted Skimmer
  - Spangled Skimmer
  - Slaty Skimmer
  - Common Whitetail
  - Emerald sp.
  - Blue Dasher
  - Calico Pennant
  - Halloween Pennant
  - Dot-Tailed Whiteface
  - Meadowhawk spp.
- Damselflies
  - Ebony Jewelwing

Lepidoptera (butterflies and moths)

- Angelwing sp.
- Ringlet
- Azure Blue

Other insects

- Tiger Beetles
- Carpenter Bees spp.

Table 5 – continued: Species list for SATWaSR
Partial list from R. Eckert

Mammals
- Moose
- Black Bear
- Fisher
- American Beaver
- Raccoon
- Mink
- Snowshoe Hair
- Water Shrew
- Coyote
- Red Squirrel
- Porcupine
- White-Tailed Deer
- Gray Fox
- Red Fox
- Eastern Chipmunk
- White-footed Mouse
- Striped Skunk

Birds
- American Crow
- Raven
- Robin
- Bluejay
- Eastern Bluebird
- Tufted Titmouse
- Chickadee
- White Breasted Nuthatch
- Red Breasted Nuthatch
- Pileated Woodpecker
- Downy Woodpecker
- Hairy Woodpecker

Amphibians
- Spring Peeper
- Wood Frog
- Green Frog
- Grass Snake
- Garter Snake
- Red-bellied Snake

Reptiles
- Spotted Turtle
- Eastern Box Turtle

Table 5 – Continued: Species list for SATWaSR
Partial list from R. Eckert

Trees

Eastern White Pine
Pitch Pine
Atlantic White Cedar (species of special concern)
Eastern Red Cedar
Northern White Cedar
Eastern Hemlock
Black Tupelo (species of special concern)
Red Maple
Sugar Maple
Sassafras
Northern Red Oak
White Oak
Black Oak
Scrub Oak
Paper Birch
Gray Birch
Black Birch
Yellow Birch
American Beech
Trembling Aspen
Bigtooth Aspen
Shagbark Hickory
American Elm
Black Cherry
White Ash
Black Ash
Eastern Hophornbeam
Blue Beech
Pin Cherry

Shrubs

Speckled Alder
Shadbush
Gray Dogwood
Silky Dogwood
Alternate Leaf Dogwood
Bunchberry
Mountain Holly
Winterberry Holly
Highbush Blueberry
Lowbush Blueberry
Sweetfern
Beaked Hazelnut
Smooth Sumac
Staghorn Sumac
Huckleberry
Witch Hazel
Leatherleaf
Sheeplaurel
Common Juniper
Poison Ivy
Blackberry
Red Raspberry
Black Raspberry
Swamp Rose
Multiflora Rose
Willows
Broadleaf Spiraea
Steeplebush
Wintergreen

Table 6: Miscellaneous Species Lists from Scott Young

WARREN FARM – 2007, 2008

Dragonflies

- Smooth Green Snake
- Ringneck Snake
- Milk Snake

Reptiles and Amphibians

- Cyrano Darner
- Common Green Darner
- Blue Dasher
- Spatterdock Darner
- White Corporal
- Frosted Whiteface

Birds

Alder Flycatcher	Chimney Swift	Least Flycatcher	Ruby-throated Hummingbird
American Black Duck	Chipping Sparrow	Lincoln's Sparrow	Ruffed Grouse
American Crow	Clay-colored Sparrow	Magnolia Warbler	Savannah Sparrow
American Goldfinch	Common Grackle	Mallard	Scarlet Tanager
American Kestrel	Common Raven	Mourning Dove	Sharp-shinned Hawk
American Redstart	Common Yellowthroat	Nashville Warbler	Snow Bunting
American Robin	Cooper's Hawk	Northern Cardinal	Solitary Sandpiper
American Tree Sparrow	Dark-eyed Junco	Northern Flicker	Song Sparrow
American Woodcock	Downy Woodpecker	Northern Harrier	Swainson's Thrush
Bald Eagle	Eastern Bluebird	Northern Mockingbird	Swamp Sparrow
Baltimore Oriole	Eastern Kingbird	Northern Parula	Tree Swallow
Barn Swallow	Eastern Phoebe	Northern Rough-winged Swallow	Tufted Titmouse
Black-and-white Warbler	Eastern Towhee	Northern Shrike	Turkey Vulture
Black-billed Cuckoo	Eastern Wood-Pewee	Northern Waterthrush	Veery
Black-capped Chickadee	European Starling	Osprey	Vesper Sparrow
Black-throated Blue Warbler	Field Sparrow	Ovenbird	Virginia Rail
Black-throated Green Warbler	Fox Sparrow	Palm Warbler	Warbling Vireo
Blue Jay	Golden-crowned Kinglet	Pileated Woodpecker	White-breasted Nuthatch
Blue-gray Gnatcatcher	Gray Catbird	Pine Grosbeak	White-crowned Sparrow
Blue-headed Vireo	Great Blue Heron	Pine Siskin	White-throated Sparrow
Blue-winged Warbler	Great Crested Flycatcher	Pine Warbler	Wild Turkey
Bobolink	Hairy Woodpecker	Prairie Warbler	Willow Flycatcher
Bohemian Waxwing	Hermit Thrush	Purple Finch	Winter Wren
Broad-winged Hawk	Herring Gull	Red-bellied Woodpecker	Wood Duck
Brown Creeper	Hooded Merganser	Red-breasted Nuthatch	Wood Thrush
Brown-headed Cowbird	House Finch	Red-eyed Vireo	Yellow Warbler
Canada Goose	House Sparrow	Red-shouldered Hawk	Yellow-bellied Sapsucker
Canada Warbler	House Wren	Red-tailed Hawk	Yellow-billed Cuckoo
Cedar Waxwing	Indigo Bunting	Red-winged Blackbird	Yellow-rumped Warbler
Cerulean Warbler	Kentucky Warbler	Rose-breasted Grosbeak	Yellow-throated Vireo
Chestnut-sided Warbler	Killdeer	Ruby-crowned Kinglet	

Table 6 – continued: Miscellaneous Species Lists from Scott Young

DRAGONFLY OBSERVATIONS - OTHER SITES IN BARRINGTON - 2008

Robinson Bog: Lilypad Forktail

Swains Lake: Orange Bluet
Lilypad Forktail

Isinglass River, Route 126

Dragonhunter
Fawn Darner
Autumn Meadowhawk
Least Clubtail
Canada Darner
Stream Bluet

Table 7: Watersheds and Sub-watersheds

Watershed Hydrologic Unit Code 10	Sub-Watershed Hydrologic Unit Code 12	Acreage	% Total Town Area
Cocheco River Watershed (0106000306)	Axe Handle Brook (010600030602)	115.3	0.4
	Long Pond (010600030606)	1,955.7	6.3
	Lower Cocheco River (010600030608)	61.5	0.2
	Lower Isinglass River (010600030607)	8,085.3	26.0
	Nippo Brook-Isinglass River (010600030607)	3,648.4	11.7
Great Bay Drainage (0106000310)	Bellamy River (010600030904)	10,028.0	32.2
	Oyster River (010600030904)	2,879.5	9.3
Lamprey River (0106000304)	Bean River (010600030405)	145.1	0.5
	Little River (010600030709)	4,198.5	13.5

[Source:USDA Natural Resource Conservation Service, 2001]

Table 8: Official List of Public Waters in Barrington

Waterbody Name	Waterbody Type	Area (acres)	Approx. Surface Elevation (feet)
Ayers Pond	Great Pond w/ artificial impoundment	228.0	233
Mendums Pond	Great Pond w/ artificial impoundment	252.7	219
Nippo Pond	Great Pond w/ artificial impoundment	85.3	330
North River Pond	Great Pond w/ artificial impoundment	80.0*	452
Round Pond	Great Pond w/ artificial impoundment	100.0	391
Swains Lake	Great Pond w/ artificial impoundment	405.0	281
Little Long Pond	Great Pond	18.1	250
Long Pond	Great Pond	39.0	254
Stonehouse Pond	Great Pond	14.2	382
Winkley Pond	Great Pond	11.4	167
Branch Mallego Brook	Artificial impoundment 10 acres or greater	21.2	239
Farm Pond	Artificial impoundment 10 acres or greater	10.0	not reported
Preston Pond	Artificial impoundment 10 acres or greater	10.0	not reported
Total		**1,274.9***	

[Source: Official List of Public Waters – New Hampshire DES, 2008]
* includes acreage outside of the Barrington town limit.

Table 9: Dams and Impoundments Located in Barrington

HAZARD CLASS	NAME	RIVER	HT	LENGTH	IMPND ACRES	DAM OWNER	LAST INSPECTION
S	AYERS POND DAM	TR ISINGLASS RIVER	18	375	236	NH WATER RESOURCES COUNCIL	5/23/2008
S	SWAINS LAKE DAM	BELLAMY RIVER	17	433	409	TOWN OF BARRINGTON	10/25/2007
L	NIPPO POND DAM	NIPPO BROOK	9	215	85	NH WATER RESOURCES COUNCIL	6/4/2004
inactive	CRITCHETT MILL	NIPPO BROOK	10	116	85	MR J L CRITEHETT	5/1/1978
inactive	LOCKE MILLS	ISINGLASS RIVER	12	350		NH WATER RESOURCES COUNCIL	5/2/1978
inactive	WINKLEY MILL SITE	ISINGLASS RIVER				MR J DOUGLAS MACRAE	5/3/1978
inactive	LOCKE MILL SITE	ISINGLASS RIVER				NH WATER RESOURCES COUNCIL	5/3/1978
inactive	BERRY RIVER DAM	BERRY RIVER	12	330		MR F J BERRY	5/2/1978
L	BERRY RIVER DAM	BERRY RIVER	29	50	0.75	MR JOSEPH CARBAUGH	10/25/2007
inactive	BERRY RIVER DAM	BERRY RIVER	15	70		MR PAUL LEWIS	5/2/1978
L	ROUND POND DAM	TR COCHECO RIVER	3	220	109	CITY OF ROCHESTER	8/22/2005
inactive	LONG POND OUTLET	BERRY RIVER	10			MR A HARLAN COLEF	5/2/1978
inactive	OUTLET AYERS LAKE	AYERS POND BROOK	8	80		PACIFIC MILLS	5/2/1978
L	BRANCH MALLEGO BROOK DAM	TR BELLAMY RIVER	8	123	25	TOWN OF BARRINGTON CONSERVATION COMMISSION	10/28/2003
inactive	MALLEGO BROOK DAM	MALLEGO BROOK	11			MAJOR WALDRON SPORTMENS ASSOC	5/3/1978
NM	GOLF COURSE POND	NATURAL SWALE	10		0.12	LAJ ASSOCIATES	7/30/1984
NM	BELLAMY RIVER	BELLAMY RIVER	11.5	94	2.7	MR PAUL F LIBERTO	12/29/1999
NM	FARM POND	NATURAL SWALE	13	300	0.41	BERNARD & MARIE DUBOIS/CECIL	9/4/1998
NM	STONEHOUSE POND	TR ISINGLASS RIVER	6		14.2	NH FISH & GAME DEPARTMENT	5/1/1978
NM	PRESTON POND	TR ISLINGLASS RIVER	8	95	10	MR & MRS BRIDEAU	6/23/1997
inactive	STONEHOUSE FARM POND	TR ISINGLASS RIVER	2	50	0.12	MR CLARENCE GARNETT	10/6/1987
NM	FARM POND	NATURAL SWALE	10		0.1	MR RICHARD LEVRIE	5/3/1978
NM	FARM POND	NATURAL SWALE	8		0.25	MS RUTH RUEL	5/2/1978

HAZARD CLASS	NAME	RIVER	HT	LENGTH	IMPND ACRES	DAM OWNER	LAST INSPECTION
inactive	ORKIN DAM	NATURAL SWALE	5	111	0.25	MR JORGE MADARIAGO	5/3/1978
NM	WILDLIFE & FIRE PROTECTION POND	NATURAL SWALE	12		0.25	BARRINGTON MIDDLE SCHOOL	5/8/1998
inactive	EDUCATION POND	NATURAL SWALE	9	130	0.01	TOWN OF BARRINGTON	5/1/1978
NM	WILDLIFE & FIRE PROTECTION POND	NATURAL SWALE	5		0.34	LAJ ASSOCIATES	5/1/1978
NM	FIRE PROTECTION POND	UNNAMED STREAM	3	12	1.5	MR JOHN SVENSON	10/6/1987
NM	WILDLIFE & FIRE PROTECTION POND	NATURAL SWALE	4		0.3	MR DOUGLAS HATCH	5/3/1978
inactive	FARM POND	TR ISINGLASS RIVER	5	70	10	MS CAROLYN BEDFORD	8/6/1991
NM	PIERCE POND DAM	NATURAL SWALE	10		2	MR RONALD DYER	5/8/1998
NM	LANDRY WILDLIFE POND	UNNAMED STREAM	5.8	130	1	MR JAMES LANDRY JR	8/31/1988
L	SCRUTON POND ROAD	TRIB TO ISINGLASS	5.5	16	29.4	TOWN OF BARRINGTON	6/4/2004
NM	SAULNIER RECREATION POND	BELLAMY RIVER	7	95	0.16	MS DORIS A SAULNIER ret mail	5/19/1989
inactive	ROGER WILLIAMS DAM	STONEHOUSE BROOK	11	175	195	MR ROGER WILLIAMS	1/23/1990
NM	ROCHESTER RESERVOIR DIKE	ROCHESTER RESERVOIR	2	20	56	CITY OF ROCHESTER PWD	9/18/2007
NM	LAPRADE DETENTION POND	TRIB TO ROUND POND	11.5	250	0.3	MR ANDRE LAPRADE	8/16/2007

[Source: NH Department of Environmental Services, Dam Safety Bureau, 2009]
Hazard Class: NM = non menace, L = low hazard, S= Significant Hazard, H = High Hazard

Table 10: Shoreline and Buffer Width Acreages

Shoreline Buffer Width	Buffer Area (acres)	% Total Town Area
Perennial and Intermittent Streams and Shoreline Length Total Length = 750,320.4 linear feet		
50 foot width	1,327.8	4.3
100 foot width	2,635.0	8.5
150 foot width	3,920.0	12.6
200 foot width	5,184.7	16.7
250 foot width	6,432.9	20.7
300 foot width	7,665.1	24.6
Excluding Intermittent Streams (Perennial Streams and Shoreline Length = 633,944.4 linear feet)		
50 foot width	1,063.8	3.4
100 foot width	2,112.7	6.8
150 foot width	3,145.3	10.1
200 foot width	4,164.8	13.4
250 foot width	5,174.5	16.6
300 foot width	6,175.6	19.9

[Source: GRANIT Data Mapper at http://mapper.granit.unh.edu/viewer.jsp]

Table 11: Wetlands from National Wetlands Inventory

Wetland Type	Acreage - Including Open Water	% of Wetlands	% of Town's Total Area
Riverine – associated with rivers	32.4	0.6	< 0.001
Palustrine – associated with ponds	3,487.6	73.4	11.2
Lacustrine – associated with lakes	1,232.1	26.0	4.0
Total Wetlands	**4,752.1**	**100.0**	**15.3**
Wetlands within 150' of a road	2,820.5	59.4	9.1
Prime Wetlands	1,863.8	39.2	6.0

[Source: US Fish and Wildlife Service, Town of Barrington]

Table 12: Land Conservation Focus Areas

Name	Area Type	Acres*	% Total Town Area
Bumfagging Hill	Core	1,991.5	6.4
	Supporting Landscape	1,317.3	4.2
Creek Pond Marsh	Core	671.2	2.2
	Supporting Landscape	1,536.7	4.9
Lower Isinglass River	Core	1,260.9	4.1
	Supporting Landscape	954.8	3.1
Middle Isinglass River	Core	504.4	1.6
	Supporting Landscape	330.8	1.1
Preston Pond	Core	207.9	0.7
	Supporting Landscape	172.9	0.6
Rochester Neck	Core	246.0	0.8
	Supporting Landscape	--	--
Stonehouse Brook	Core	726.5	2.3
	Supporting Landscape	742.4	2.4
Upper Isinglass River	Core	71.0	0.2
	Supporting Landscape	311.0	1.0
Total Combined Areas		**11,045.3**	**35.5**
Total Core Focus Areas		5,679.3	51.4**
Total Supporting Landscape		5,366.0	48.6**

[Source: The Land Conservation Plan for New Hampshire's Coastal Watersheds, 2006]

* Acreage within the town of Barrington only

** Percent of identified core and supporting areas

Table 13: Resource Summary of Land Conservation Core Focus Areas

Resource (total core area acreage)	Bumfagging Hill (2,360 acres)	Creek Pond Marsh (670 acres)	Lower Isinglass River (1,260 acres)	Middle Isinglass River (500 acres)	Preston Pond (340 acres)	Rochester Neck (1,610 acres)	Stonehouse Brook (726 acres)	Upper Isinglass River (850 acres)
Unfragmented Forest	Part of a 4,360 acre block	Part of a 2,300 acre block	Part of a 1,230 acre block	Part of a 1,260 acre block	Part of a 1,800 acre block	Part of a 823 acre, a 830 acre, and 1,020 acre blocks	Part of a 1,810 acre block	Part of a 1,420 acre block
Aggregated Block	Within a 14,000 acre block	Within a 14,000 acre block	Within a 8,000 acre block	Within a 14,700 acre block	Part of a 14,700 acre block	Within a 8,600 acre block	Within a 14,700 block	Within a 14,700 acre block
High quality stream watersheds	855.5 acres	417.5 acres	None	None	180 acres	None	730 acres (combined)	None
Important stream reaches	None	None	3.5 miles w/diverse fish	3.5 miles w/diverse fish	None	None	None	None
Dams	None	None	None	None	1 dam	None	1 dam	None
River/stream miles	4.9 mi 1st, 3.0 mi 2nd, 0.5 mi 3rd	1.9 mi 1st, 0.8 mi 2nd	2.9 mi 1st, 1.9 mi 2nd, 4.3 mi 4th	1.6 mi 1st, 0.2 mi 2nd, 1.8 mi 4th	0.8 mi 1st	1.2 mi 1st, 0.6 mi 2nd, 3.3 mi 3rd, 6 mi 4th, 1.4 mi 5th	0.6 mi 1st, 0.4 mi 2nd, 1.0 mi 3rd, 0.9 mi 4th	1.2 mi 1st, 1.7 mi 2nd, 5.0 mi 3rd, 0.4 mi 4th
Plants of conservation concern	Small Whorled Pogonia (T)	None known	None known	None known	None known	None known	None known	None known
Animals of conservation concern	Spotted Turtle	None known	Great Blue Heron Rookery; Spotted, Wood, Blanding's Turtles	None known	None known	Upland Sandpiper (E), Pie-billed Grebe (E)	None known	None known
Significant wildlife habitats	Marsh, peatland	Marsh, peatland	Floodplain forest, marsh, peatland	Floodplain forest, marsh, peatland	Grassland, marsh, peatland, ridge/talus	Floodplain forest, grassland, marsh, peatland	Marsh, peatland	Floodplain forest, marsh, peatland

Resource (total core area acreage)	Bumfagging Hill (2,360 acres)	Creek Pond Marsh (670 acres)	Lower Isinglass River (1,260 acres)	Middle Isinglass River (500 acres)	Preston Pond (340 acres)	Rochester Neck (1,610 acres)	Stonehouse Brook (726 acres)	Upper Isinglass River (850 acres)
Exemplary natural communities/systems	None known	None known	None known	None known	Red Oak-Ironwood-Pennsylvania sage woodland	Red maple floodplain forest	None known	None known
High yield aquifer (>1,000 sq.ft/day)	None	None	363.2 acres	57.2 acres	None	1,329.8 acres	21.4 acres	121.6 acres
Surface water intakes	None	None	None	None	None	None	None	None
Wells	None	None	None	None	None	None	None	None
Wellhead protection areas	Pepperidge Woods (3.9 acres)	Emerald Acres (70.3 acres)	Halcyon Hills (26 acres)	None	Inn at Secretariat Estates (77.6 acres)	City of Dover (288.5 acres), Green Hills Mobile Park (6.5 acres)	None	Strafford Elementary School (10.8 acres)
Favorable gravel well sites	None	None	100.3 acres	17.1 acres	None	575.6 acres	None	20.5 acres
Prime or statewide importance farm soils	--	None	9.6 acres prime soils	3.1 acres	6.6 acres prime soils, 9.4 acres statewide imp.	632.3 acres prime soils, 61.7 acres statewide imp.	4.0 acres prime soils, 8.4 acres statewide imp.	1.7 acres statewide imp.
Permanently protected managed forest	150 acres	9 acres	68 acres	--	--	102 acres	--	19 acres
Permanently protected natural area	--	589	--	--	--	2.0 acres	--	--
Not permanently protected – public or institutional ownership	--	--	52 acres	--	--	--	--	--

[Source: The Land Conservation Plan for New Hampshire's Coastal Watersheds (2006)]

Table 14: Conserved and Protected Lands in Barrington			
ID#*	**Name**	**Acres**	**% Town Area**
1	Bellamy Reservoir Easements	57.0	0.2
2	Bellamy River Wetland Preserve	5.1	0.0
3	Boodey	151.5	0.5
4	Borodavchuk	96.2	0.3
5	Coachman	33.5	0.1
6	Deer Ridge	18.7	0.1
7	Dexter 1	14.0	0.0
8	Dexter 2	10.2	0.0
9	Dominic Dr.	7.7	0.0
10	Fernald	9.7	0.0
11	Forest Ridge	83.7	0.3
12	Gerrior 1	7.5	0.0
13	Goodwill	156.0	0.5
14	Hale Rd.	5.3	0.0
15	Hertel	6.5	0.0
16	James Henry Drive Open Space	9.8	0.0
17	Jeffery	79.8	0.3
18	Jillette	2.6	0.0
19	Kids of the River	17.4	0.1
20	Lakeview	5.1	0.0
21	Littlefield	7.5	0.0
22	Locke Falls	12.4	0.0
23	Mendums Pond Road Open Space	70.6	0.2
24	Middle School	17.5	0.1
25	Newhall Easement	99.4	0.3
26	Olson	9.1	0.0
27	Red Fox	7.4	0.0
28	Rivers Edge	41.1	0.1
29	Rochester Water Dept.	113.2	0.4
30	Samuel A Tamposi Water Supply Reserve	1,380.3	4.4
31	Sandy Brook	19.8	0.1
32	Saulnier / Hambel	5.9	0.0
33	Schulz	43.7	0.1
34	Shady Lane	14.7	0.0
35	Sherbourne	9.2	0.0
36	Southeast State Forest	0.5	0.0
37	Stepping Stones	6.4	0.0
38	Stone Farm	11.5	0.0
39	Swains Lake Village Water District	67.8	0.2
40	Town of Barrington Land	98.4	0.3

Table continued on next page

Table 14: Conserved and Protected Lands in Barrington			
ID#*	**Name**	**Acres**	**% Town Area**
41	Trickey Lot - Town Forest	49.4	0.2
42	Turbocam	8.8	0.0
43	UNH – Mendums Pond Recreation Area/McDaniel	197.4	0.6
44	UNH - Milne Lot	67.3	0.2
45	Wallace	24.3	0.1
46	Warren	242.4	0.8
47	White Crest	4.2	0.0
48	Whitney / Juniper Hill	12.0	0.0
	Total	**3,419.2**	**11.0**

[Source: NH GRANIT 2007 and the Town of Barrington 2009]

Note: Parcels smaller than 0.1 acres are not included in this list

* ID numbers are also shown on Map 1

Table 15: Data Sources Used in NRI Tables and Maps		
Resource	**Data Source**	**Last Updated**
Municipal Boundaries	NH GRANIT	Unknown, delineated from USGS Digital Line Graphs at a 1:24,000 scale.
National Wetlands Inventory (NWI)	US Fish and Wildlife Services	Nov. 2007
Surface Water	National Hydrography Data Set (DES)	Nov. 2006
River/Streams	National Hydrography Data Set (DES)	Nov. 2006
GRANIT Conservation Land	NH GRANIT	Jan. 2007
Aquifers	NH GRANIT	Mar. 2001
Coastal Esturine Land Conservation Plan Conservation (CELCP) Focus Areas	Coastal Watershed's Land Conservation Plan (The Nature Conservancy)	June 2006
Wildlife Action Plan Habitat Areas	NH Fish and Game	June 2007
Well Head Protection Area	NH Dept. of Environmental Services (DES)	Nov. 2006
Hydrologic Unit Code 12 Watersheds	NH Dept. of Environmental Services (DES)	Nov. 2006
Soils of Special Importance	Natural Resources Conservation Service (NRCS) County Soil Survey's	Carroll County-1977 Rockingham County-1994 Strafford County-1973
Land Use	Strafford Metropolitan Planning Organization (SMPO) Database	Apr. 2007
Roads	NH DOT	Dec. 2007
Wildlife Action Plan Conservation Focus Areas	NH Fish and Game	June 2007
Forest Blocks	NH Fish and Game	June 2007
Aggregated Blocks	NH Fish and Game	June 2007

APPENDIX B

Regulatory Protection of Natural Resources (Zoning Ordinance Excerpts)

Article 6. Conservation Subdivisions

50% open space in General Residential district
60% open space in Neighborhood Residential district
75% of open space must be contiguous and not less than 10,000 square feet

Common open space shall, to the greatest extent possible protect:

- Site features identified in the site inventory and analysis as having particular value in the context of preserving rural character; and
- Environmental corridors, such as streams, rivers, or wildlife trails, as well as areas that are contiguous to protected open space on adjoining parcels, considered to be of particular importance for preserving.

The location of proposed open space shall be situated so as to maximize common boundaries with existing or future open space on adjacent tracts.

To preserve scenic views, ridgetops and hilltops should be contained within common open space wherever possible.

Natural features shall generally be maintained in their existing condition, but may be modified to improve appearance or restore their overall condition and natural processes.

Article 7. Supplemental Regulations, Section 7.1

No use or structure otherwise permitted under this Ordinance shall be permitted by right or special exception which unreasonably and adversely affects the quality of air, water supplies, waterbodies or courses, or other significant natural or artificial resources of the Town of Barrington. The burden of establishing compliance with these Performance Standards shall be on the applicant and/or property owner. The town, through an appropriate regulatory official or body, may require an environmental assessment or other appropriate studies, at the applicant's or property owner's expense, to aid in the determination of compliance with the following standards……..

Article 9. Wetlands Protection District Overlay

A buffer area of fifty (50) feet is required from the edge of any wetland. If a vernal pool is determined to be located on a site a greater buffer may be required by the Planning Board.

Prime Wetlands - a minimum buffer of one hundred (100) feet shall be required from the edge of the wetland. The Planning Board may require a larger buffer around a Prime Wetland if an assessment of its functions indicates that such an increase is warranted to protect the roles the wetland serves that are of value to the public or the environment including, but not limited to, flood water storage, flood water conveyance, groundwater recharge and discharge, erosion control, wave attenuation, water quality protection, scenic and aesthetic use, food chain support, fisheries, wetland plant habitat, aquatic habitat and wildlife habitat.

Within any required wetland buffer, no structures, impermeable surfaces, parking spaces, or construction related activities, including dredging, filling, and re-grading, shall be permitted (exceptions for lots of record, repair/replacement of existing structures, driveway crossings, and other activities by Special Permit).

Article 11. Shoreland Protection District Overlay

75-foot setback for structures from perennial streams, and lakes or ponds over 2 acres

100-foot setback for structures from Isinglass River

Article 12. Groundwater Protection District Overlay

Groundwater Protection District (entire town) – includes performance standards and/or restrictions on high risk uses and use or storage of manure, fertilizers, compost, and regulated hazardous substances.

Stratified Drift Aquifer Area – additional performance standards require a stormwater management plan for uses that exceed 15% or more than 2,500 square feet (whichever is greater) of impervious surface coverage.

A description of maintenance requirements for structures required to comply with the necessary performance standards must be recorded to run with the land on property deeds.

Article 13. Floodplain Management District Overlay

No development or obstructions in the floodway.

Buildings must be constructed above the flood elevation.

Flood-proofing required for buildings and accessory components (tanks, utility connections etc.).