ENV
Technical Appendix

Environment, Recreation & Land Use

Local Solutions for the Strafford Region

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Authors:
Gregory Jones
Samantha DePlanche
Colin Lentz
Thomas Brown

Strafford
REGIONAL PLANNING
COMMISSION

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Introduction

Purpose

The purpose of the *Environment, Recreation & Land Use* appendix is to provide a review of existing natural resources in the region and an overview of the associated benefits and critical role these resources play in the long term of health and well-being of residents, local economies, and ecosystems.

The use and protection of natural resources is shaped by a range of policies, implementation strategies, and programs. An overview of this is included in this appendix to serve as a resource for community Planning Boards, Conservation Commissions, Water Boards, Historic Commissions, Recreation Commissions, Energy Commissions, Water Commissions, Land Trusts, non-profit organizations, developers, and the general public.

Vision

The connection between vibrant economies, healthy people, and environmental quality is recognized by the region's communities. The planning and development practices implemented by communities in the Strafford region effectively balance social and economic growth with the protection of natural resources and environmental quality. The scenic vistas, wildlife, water quality, rural landscapes, and opportunities for recreation continue to be recognized as the key to the region's quality of life and economic sustainability for future generations.

The Strafford region seeks to protect and maintain resilient drinking water, storm water, and wastewater systems and facilities through investments and operations for the public health and safety needs of a growing population. The region will support the protection of the important natural, cultural, and recreational resources that define the Great Bay coastal watershed.

Natural Resources Are a Priority for Citizens

In early 2013, SRPC staff generated a comprehensive planning matrix that organized the various goals, recommendations and visions from local and regional documents with the six New Hampshire Livability Principles. The Livability Principles are a set of concepts which provide a common framework for all New Hampshire Regional Planning Commissions to work from during the drafting process of each regional master plan. Several environmental concepts were drawn from the Livability Principle Matrix including agriculture, forestry, recreation & culture, water quality, land management, air quality, and energy. These concepts serve as a base for how this appendix is structured.

During the spring and summer of 2013, the University of New Hampshire's (UNH) Survey center staff conducted a state-wide telephone survey (known as the Granite State Future 2013 Statewide Survey) for the nine New Hampshire Regional Planning Commission service areas in order to gauge the specific areas of interest of the nearly 3,000 residents surveyed for this project.

The results of the survey provide an important look at the values of residents across the state. These values are an important planning tool and guide. When asked about the importance of a range of issues residents said that *environmental protection* should be the top priority (42%) for policymakers and for the investment of public dollars. respondents viewed *energy efficiency* and the *availability of energy choices* as the second most significant priority (35%) for policymakers and the investment of public dollars, with the exception of public charging stations for electric vehicles. The Statewide survey found that approximately 90% of residents feel their community should *actively encourage the promotion of local agriculture*, with roughly 86% of residents supporting the *promotion of safe places to bike and walk,* and 81% of surveyed residents *encouraging the protection of historic buildings and neighborhoods*.

In addition to the UNH Survey Center's Granite State Future 2013 Statewide Survey, SRPC conducted a qualitative Community Engagement Process in which staff attended 23 community events within the region and partnered with other regional organizations to ensure widespread outreach. During the community engagement process, public comments were collected and analyzed in order to ascertain what individuals like most about the region and what areas are in need of improvement. With equity in mind, SRPC staff attended specific outreach events in order to engage some of the more commonly underrepresented populations (such as senior/community centers, food pantry's and even the Lilac Mall's Armed Forces Day in Rochester, among others) and to better understand the regions existing conditions and priorities for the future.

Overview of Environmental Decision-making at the Federal, State & Local Level

Federal Environmental Protection

A number of environmental policies and programs were developed in the 1970's and continue to shape the use of resources and protection of human health today.

The National Environmental Policy Act (NEPA) of 1970 set goals for protecting, maintaining, and enhancing the environment and the resources it provides. It also required all other federal agencies to incorporate environmental considerations in their planning, decision-making, and implementation of their regulations. As part of NEPA, the U.S. Environmental Protection Agency (EPA) was established to develop regulations and set standards for development and industry practices that impact environmental quality and human health[1].

The 1970 Clean Air Act (CCA) established sets national standards for air quality and that must be met by stationary (e.g. power plants) and mobile (e.g. cars and trucks) sources of pollution. The Statute was designed in-part to fill shortcomings of previous attempts to reduce air pollution on a regional basis. Action at the national level was spurred by widespread public concern over significant air pollution across the country, and national policy on air pollution was critical for future challenges

One way that the CCA influences local planning in the Strafford region is through transportation planning. 1990 amendments to the CCA require that transportation planning organizations like the Strafford Metropolitan Planning Organization (SMPO) contribute to national air quality goals. SMPO is required to quantitatively demonstrate that its plans and programs will help reduce harmful emissions from mobile sources.

The Southeast region of New Hampshire is particularly affected by ground-level ozone (which is a major concern for residents with respiratory health problems such as asthma). Reducing greenhouse gas emissions from cars and trucks reduces ozone concentrations. SMPO works to carefully plan regional transportation to encourage alternative modes of transportation, reduce congestion and make commutes more efficient, and reduce overall vehicle-miles-traveled (VMT).[2]

A second important act that impacts quality of life in the region is the Clean Water Act of 1972. This act laid the foundation for protection of water resources through rules designed to reduce the impact development has on important wetlands and eliminate harmful pollutants from streams, rivers, and lakes.[3,4] For more information about management of water pollution, see the Water Infrastructure Appendix.

The Environmental Protection Agency's purpose is to ensure that:

- All Americans are protected from significant risks to human health and the environment where they live, learn and work;
- National efforts to reduce environmental risk are based on the best available scientific information;
- Federal laws protecting human health and the environment are enforced fairly and effectively;
- Environmental protection is an integral consideration in U.S. policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade, and these factors are similarly considered in establishing environmental policy;
- All parts of society - communities, individuals, businesses, and state, local and tribal governments - have access to accurate information sufficient to effectively participate in managing human health and environmental risks;
- Environmental protection contributes to making our communities and ecosystems diverse, sustainable and economically productive; and
- The United States plays a leadership role in working with other nations to protect the global environment.

(Source: EPA)

State-Level Environmental Protection

New Hampshire's state-level counterpart to the EPA is the Department of Environmental Services (DES). The state legislature writes laws that uphold federal standards for protect clean water and air, ecosystem integrity, and human health, and it grants authority to DES to enforce those laws. The department's mission statement is "to help sustain a high quality of life for all citizens by protecting and restoring the environment and public health in New Hampshire." [5]

In addition to controlling air and water pollution, DES is responsible for protecting sources of drinking water, regulating waste disposal, maintaining dams owned by the state, and controlling threats to communities from floods. DES is authorized by the state legislature to investigate and monitor sources of pollution, and compel polluting entities (municipalities, businesses, organizations, and individuals) to come into compliance with applicable federal or state law – whichever is more stringent[6].

The Clean Air Act is a guiding document for the Air Resources Division at DES, which regulates air pollution from stationary and mobile sources through permitting and compliance programs. The Air Resources Division also works to protect human health through programs that monitor the release of toxic air pollutants and how air flows throughout the state. Through its energy & climate change program, DES supports efforts to improve energy efficiency, reduce greenhouse gas emissions, and increase resilience against increasing storm activity throughout the state. Guided by state legislation under the Clean Water Act, DES's water resources division works to protect the health of New Hampshire's vital lakes, ponds, rivers, and groundwater. Individual programs oversee the operation of public water systems, protect sources of drinking water, ensure the proper maintenance and operation of wastewater treatment facilities, monitor the quality of lakes and river, and perform numerous other functions. Divisions at DES receive advice and guidance from councils made up of representatives of various public and private sectors including: industry and business, municipal government, recreation, public interest groups, and several others.

Local Environmental Protection

Municipalities in New Hampshire maintain local autonomy when it comes to land use decisions. However, any local projects must satisfy federal and state environmental standards. These regulations are designed to manage impacts to critical natural resources including air and water, which are the foundation of public health.

The Strafford Regional Planning Commission can provide services to communities trying to navigate complex federal and state regulations and requirements. SRPC offers a wide range of services that can help communities balance their development and resource protection goals. These include:

- Master plan development and revision services
- Zoning ordinance revision services
- Mapping services
- Training and technical services
- Land use ordinance modeling services
- Land conservation planning services
- Subdivision & Site Planning services
- Transportation corridor studies
- Access management planning service

Trends & Existing Conditions

Agricultural Information, Resources & Local Organizations

The conventional practice of "bulk" agriculture has historically dominated the market in the United States. This approach to growing food is heavily supported by national policy and federal subsidies. Mass producing crops in such high volumes relies on chemicals and mechanization, and improper management can result in server environmental impacts. Additionally, only certain crops are suited for bulk agriculture practices, such as corn and soybeans. Soybeans are an important crop for food production and livestock feed, but corn is the undisputed king of crops. Numerous environmental, financial, and social challenges can be directly tied to corn production in the United States, but for better or worse, corn is a pillar of the national economy. In 2011, 32% of global production came from the U.S. – 84 million acres of corn produced $64 billion in cash sales[7]. By comparison, over 100 million acres of hay and wheat (the next highest sales after soybeans) came to $30 billion. Much of the corn produced is used as livestock feed, ethanol fuels, and sweeteners like corn syrup. The U.S. is also the greatest exporter of corn: 20% of production is sold to other countries in grain form, or feeds exported poultry, beef, and pork[8]. Massive production of one or two crops reduces the overall resilience of national food supplies. Because corn is used for numerous products and so integrated across the national economy, this means reduced resilience for sectors – such as manufacturing – that are seemingly unrelated to agriculture.

[Photo Credit: NH Farm]

Putting aside any controversy over monoculture farming practices – regional economics and wellbeing are tied to agriculture practices at the national level. Heavy reliance on out-of-state food production leaves the residents of Stafford region (and New Hampshire at large) vulnerable to long-term effects, such as rising fuel prices, sudden market changes, and damage from severe weather. Concerns about food security, and the high cost associated with producing and selling crops on the bulk agriculture market, have given way to the growing concept of *sustainable agriculture*. Sustainable agriculture integrates economic and social equity with profitability and environmental protection, and nurtures a close connection between the producer and the consumer. It is attracting of local agriculturalists that understand the challenges facing the farming industry today, and who appreciate practices, which allow farmers to maintain a profitable income, support their families, continue New Hampshire's farming tradition, and protect the environment for future generations.

The purpose of this section is to provide information and insight into the past, current and future status of agriculture within the Strafford Region. This section will highlight existing agricultural protection efforts, inventory the region's working farms, and identify local grassroots organizations that are actively working to promote and sustain this essential resource. Whether being used for lumber production, maple sugaring or beekeeping, greenhouse space, livestock farming, growing fruits and vegetables, trees and turf, hay production, or the many other forms of agriculture, New Hampshire's farmlands are vital to the state and regional economy, its ecosystems, our cultural vitality, and warrants proper stewardship.

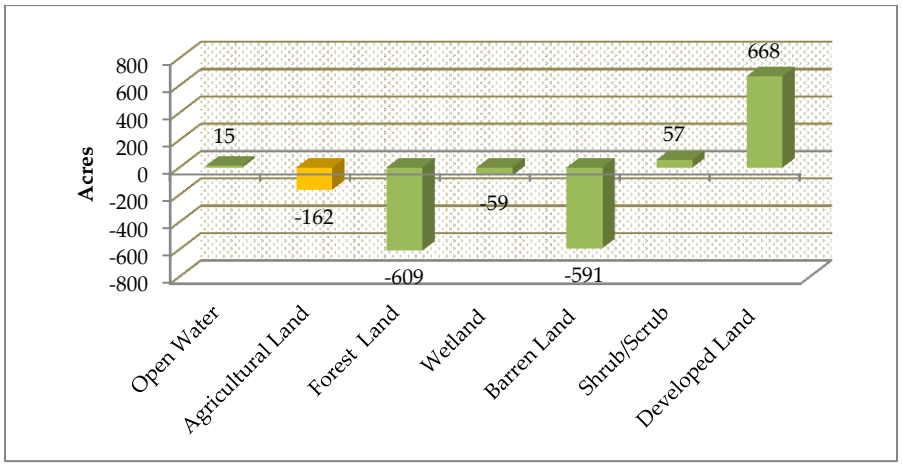
Agriculture Highlights & Data

The agricultural land use change data in this section were acquired from a comparison of the 2005 and 2010 SRPC land use update data, based off high resolution data from, NH GRANIT, The Complex Systems Research Center (CSRC), the University of New Hampshire, New Hampshire Office of Energy and Planning (NH OEP), and the Community Technical Assistance Program (CTAP). Between 2005 and 2010, the Strafford region lost 162 acres of agricultural land (Figure 1). The land use change data were then further assessed through a review comparison with the 2007 USDA Census of Agriculture.

According to the 2007 USDA Census of Agriculture, the total farmland acreage in the NH Counties containing SRPC communities decreased by 6% from 91,354 acres in 2007 to 86,045 acres in 2012 (Figure 2). The median farm size in counties containing SRPC communities has increased by 6% during the 5 year study period, from approximately 38.7 acres in 2007 to 41 acres in 2012, while the average size of farms in these counties have decreased by 6% from 2007 to 2012 (Figure 3). Lastly, an 11% increase in the number of farms within the counties containing SRPC communities was seen between 2007 and 2012 (Figure 4).

[Photo Credit: NOFA-NH]

Figure 1 - Strafford Region Farmland Conversion Data
[Data Sources: 2005/2010 Land Use data digitized by SRPC staff - CTAP]



Climate change will likely impact the types of crops that can be grown in the region. Warmer temperatures may provide farmers with the opportunity to grow new crops. Invasive species and pests may become a greater nuisance.

Figure 2 - Total farmland acreage by county containing SRPC communities
[Data Source: 2007/2012 USDA Census of Agriculture – By County]

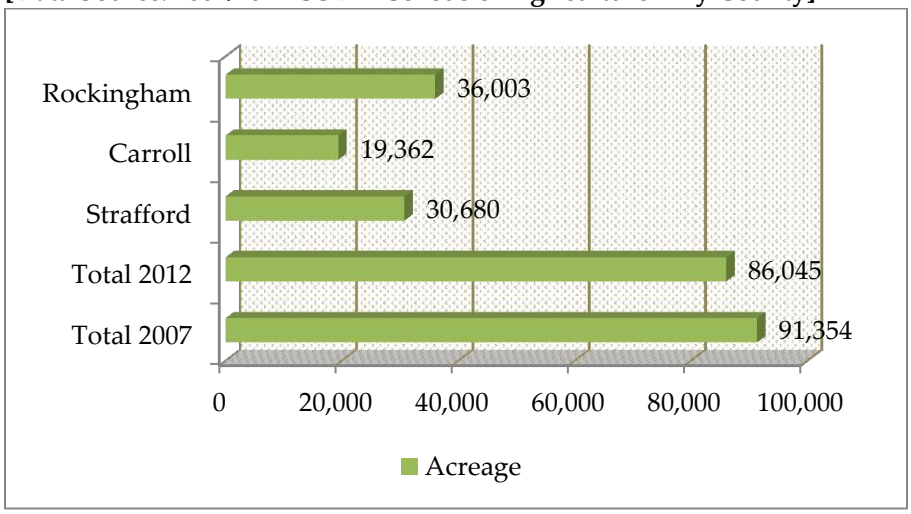


Figure 3 - Average Farm Size by county containing SRPC communities
[Data Source: 2007/2012 USDA Census of Agriculture – By County]

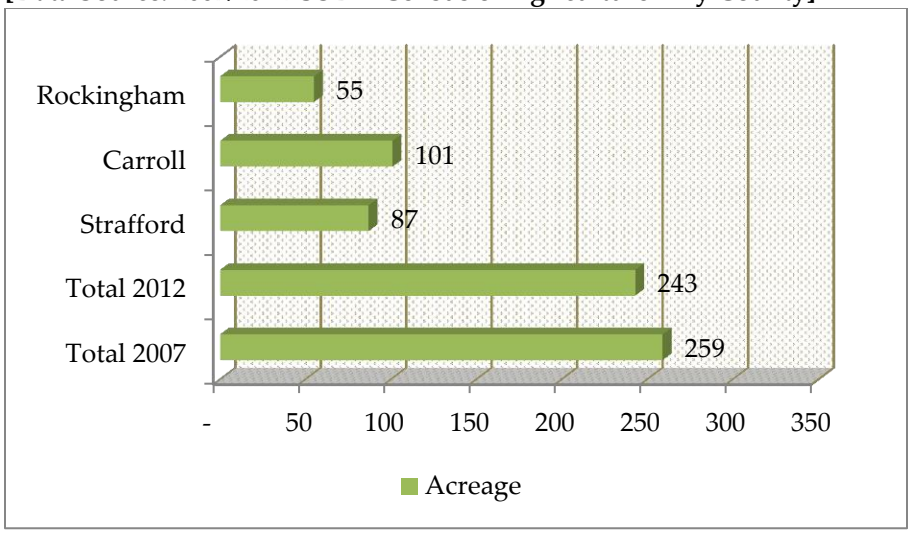
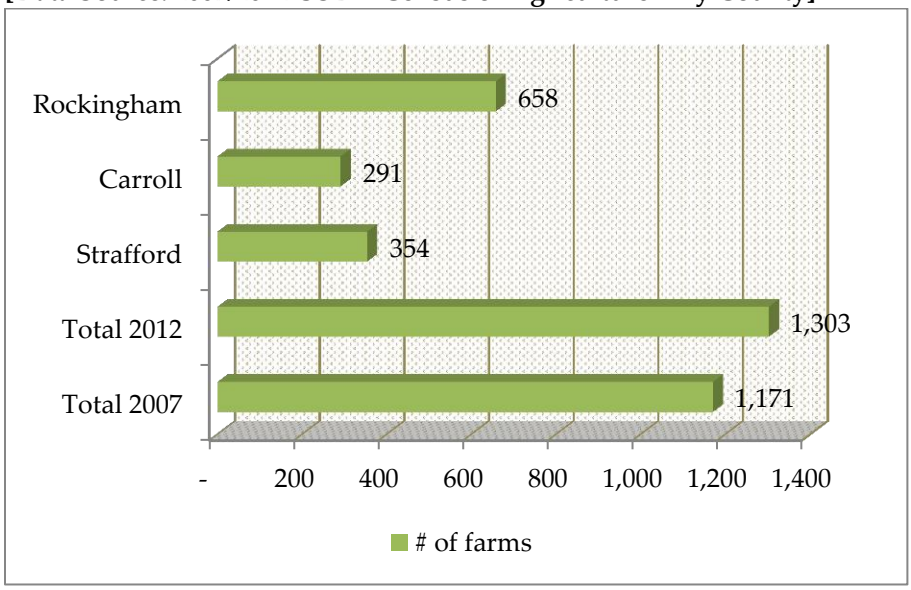


Figure 4 - Number of farms by county containing SRPC communities
[Data Source: 2007/2012 USDA Census of Agriculture – By County]



Annually, the United States loses approximately 1.2 million acres of farmland[9]. The data for the Strafford region show an alarmingly consistent trend. This is likely due to the cost of land and accelerating urban development. Interestingly, despite continuing loss of agricultural land and open space, smaller, local farms are growing in number in the Region and statewide. In 2012, 55% of farms in New Hampshire were 50 acres or smaller[10]. In the same year New Hampshire ranked fifth among U.S. states for direct sales from farms to retailers[11]. A wide range of smaller farms offers greater potential for resilient and secure food production throughout the region.

Mobility is a major factor in examining food security. Rural towns with low population densities may have limited options for quality food; often convenience stores – which lack fresh fruits and vegetables – are the only sources of food. If public transportation is limited, low-income residents may be unable to access quality food, even if their community has large grocery stores.

Working Farms & Access to Local Produce

The concept of Community Supported Agriculture (CSA) has become a popular way of connecting consumers to locally grown food within the past 25 years. The CSA approach is designed to be mutually beneficial: residents near a small farm can buy "shares" of the crop before the start of the growing season –offsetting the operational costs of farming – and throughout the growing season shareholders receive seasonal produce. This approach allows farmers to market and receive payment for their products early in the growing season, helps them develop direct relationships with the consumer and respond to local demand for fresh foods instead of fluctuating national markets. CSA's provide local fresh foods that are a healthy alternative to widely available processed foods, and help develop a local sense of community.

Local farms provide residents with access to healthy food and the opportunity to connect with the growers of their food. Local farms also provide employment, support the local economy, and increase food security.

Table 1 below lists the Strafford Region's CSA's and describes the types of produce available to shareholders. Local farms also provide a range of benefits beyond healthy food.

Municipality	Name	Farm & Membership Information	Location
Barrington	Brasen Hill Farm Vegetable CSA	CSA farm offering a variety of vegetables	71 Warren Road
Lee	Blue Bell Greenhouse Pick-Your-Own CSA	CSA farm offering a variety of vegetables for shareholders to harvest	105 N. River Road
Lee	Coppal House Farm CSA	CSA farm offering pork, lamb and chicken	118 N. River Road
Lee	Mildred's Drumlin Farm CSA	CSA farm offering flowers, Christmas trees, fruit, and vegetables	314 Lee Hook Road
Lee	Wild Miller Gardens CSA	CSA farms offering vegetables, fruit, eggs, meat and maple syrup	11 Randall Road
Madbury	Osprey Cove Organic Farm CSA	A certified organic farm with produce and eggs available through CSA shares	255 Littleworth Road
Milton	McKenzie's Farm CSA	CSA farms that offers a variety of produce	71 NE Pond Road
Milton	NH Farm Museum CSA	A working farm with fresh picked organically grown produce including heirloom vegetables	1305 White Mountain Highway
Nottingham	Stone Wall Farm CSA	A certified organic farm with produce and eggs available through CSA shares	97 McGrillis Road
Rochester	Gauthiers Farm CSA	CSA farm that offers meat, variety of seasonal vegetables and other produce	40 Bernard Road
Rollinsford	Brandmoore Farm CSA	CSA farm that offers vegetables, fruit, and flowers	70 Sligo Road

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Table 1 - Strafford Region's CSA's

[Data Source: New Hampshire Department of Agriculture, Seacoast Eat Local, and Seacoast Harvest Local Food Guide]

Table 2 - Strafford Region Summer & Winter Farmers Markets

Municipality	Location	Summer Schedule	Winter Schedule
Dover	550 Central Avenue	Wednesdays, June 5-October 9	-
Durham	15 Newmarket Road	Mondays, June 3-October 7	-
Farmington	Corner of Central & Main Street behind TD Bank	Saturdays, May-October 12	-
Lee	Old Fire Station, Route 155	Thursdays, May-September	-
New Durham	Depot Road next to Post Office	Saturdays, Memorial Day-Columbus Day	-
Newmarket	220 South Main Street (Carpenter's Greenhouse)	Saturdays, June 15-September 21	1st & 3rd Saturdays, October-May
Northwood	Corner of Route 4 & Route 202A/43 near Masonic Lodge	Thursdays, May 9-October	-
Nottingham	129 Stage Road (Blaisdell Memorial Library)	Sundays, June 2-October	-
Nottingham	139 Stage Road (Community Center)	-	2nd Sunday of each month starting in November
Rochester	60 Wakefield Street (Ben Franklin parking lot)	Tuesdays & Thursdays, May 11-October 30	-
Rollinsford	141 Rollins Road (Wentworth Greenhouses)	Saturdays, June 22-October 26	-
Rollinsford	141 Rollins Road (Wentworth Greenhouses) Seacoast Eat Local Winter Market	-	Once a month, November-April

Agriculture and the Economy

According to the USDA NRCS Soil Health Key Points, soil health is a key component to preserving prime farmland for current and future sustainable agricultural production. A community, region, or state's ability to recognize the location of these soils, and its ability to capitalize on the agricultural opportunities associated with these unique areas is a fundamental component of successful, sustainable local agriculture. The Strafford Region has made progress in preserving this land; however more agricultural land conservation efforts are available, and in need of pursuit.

In addition to the agricultural land use conversion data listed under the Agricultural Legislative Highlights and Data section above, the Strafford Region was found to have just 13% of its land containing known productive "agricultural soils" preserved through land conservation efforts (see Table 3- Core Metric ID# 603 – Data Sources: 2005/2010 Land Use data digitized by SRPC staff - CTAP).

These known "agricultural soils" include the Natural Resource Conservation Service's (NRCS) "Prime and Important Farmlands" as defined below.

"The general court hereby finds it to be in the public interest to encourage the preservation of productive farms and associated structures. These structures are important in sustaining the economic viability of the state's farms, ensuring a reliable and safe local food supply, and providing an attractive environment for recreation, tourism, and wildlife. Farming in New Hampshire has a long and proud history which shaped our state's landscape. It is further declared to be in the public interest to prevent the loss of farms and their associated structures due to property taxation at values incompatible with their usage."

N.H. RSA 79-F:1
Taxation of Farm Structures and Land under Farm Structures

Definition of Farmland Soils[12]

Farmland of Statewide Importance: This is land, in addition to prime and unique farmland, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate state agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law

Farmland of Local Importance: In some local areas, there is concern for certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops, even though these lands are not identified as having national or statewide importance. Where appropriate, these lands are to be identified by the local agency or agencies concerned. In places, additional farmlands of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Using the 2005-2010 land use update data comparison, the agricultural land category (includes fields, pastures, row crops, orchards etc.), and the other agricultural lands category (used to capture farm structures), were segregated from the full list of land uses and found to include just 12,787 of the 347,893 total land acres in SRPC's service area (approximately 3.7% of the region).

Table 3 - Productive Soils Conserved - 2010 [Data Sources: NRCS SSURGO]

Town	Total Productive Soils	Total Productive Soils Conserved	Percent Productive Soils Conserved
Barrington	4,395 acres	341 acres	8%
Brookfield	7,787 acres	235 acres	3%
Dover	12,596 acres	2,230 acres	17%
Durham	6,726 acres	2,736 acres	40%
Farmington	2,398 acres	195 acres	8%
Lee	6,233 acres	1,800 acres	29%
Madbury	4,233 acres	1,080 acres	25%
Middleton	257 acres	0.50 acres	0.1%
Milton	2,403 acres	333 acres	14%
Newmarket	3,842 acres	911 acres	24%
New Durham	1,385 acres	52 acres	4%
Northwood	2,167 acres	84 acres	4%
Nottingham	2,931 acres	565 acres	19%
Rochester	10,868 acres	359 acres	3%
Rollinsford	3,805 acres	594 acres	16%
Somersworth	2,659 acres	155 acres	6%
Strafford	4,632 acres	495 acres	11%
Wakefield	18,369 acres	657 acres	4%
SRPC Region	**97,686**	**12,823 acres**	**13%**

Lastly, according to the 2007 USDA Census of Agriculture, the agriculture market in NH Counties containing SRPC communities generated more than $41 million to the state economy in 2007. Dairy farming and products contribute approximately one-third of the state's total agricultural revenues, with the major commercial crops in the state being greenhouse and nursery products, Christmas trees, corn, eggs, and apples[13].

Table 4 - Agricultural Market Value of Products sold - Vermont, Maine, Massachusetts, New Hampshire, & SRPC Counties,

	Value 2012	U.S. Rank 2007	NH Rank 2007
Vermont	$673,713,000	41	
Maine	$617,190,000	42	
Massachusetts	$489,820,000	47	
New Hampshire	$199,051,000	48	
Rockingham County	$26,035,000		3
Strafford County	$9,912,000		8
Carroll County	$5,279,000		10

[Data Source: 2007 USDA Census of Agriculture]

[Photo Credit: University of New Hampshire – Food and Agriculture]

Forestry Resources Management

Forested lands are one of New Hampshire's most important and valuable natural resources. Whether supplying food and wildlife habitat, providing temperature control, reducing CO^2, delivering water storage, erosion/wind control, or recreational opportunities such as hiking, camping, sight-seeing and more, maintaining New Hampshire's forests is a top concern in sustaining the ecological, social and economic vitality of the state and its regions. Across New Hampshire, this resource is changing each year, and maintaining this resource for future generations depends on a healthy forest products industry which provides incentive to landowners to keep their lands in forest rather than development.

[Photo Credit: New Hampshire Magazine]

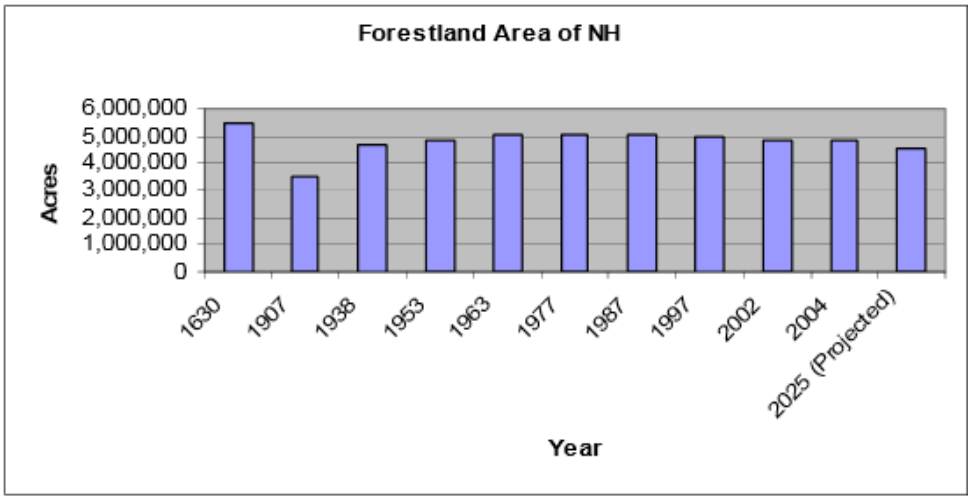
According to the Livability Principle Matrix, forestry was found to be the least discussed priority area within the Strafford region Master Plans. However, forestry was found to be a top priority area within the regional planning documents reviewed.

Forestry Highlights & Data

Though New Hampshire is the second most forested state in the country following Maine, which is 84% forested[14], the Granit State routinely loses forestland every year. According to the New Hampshire Statewide Forest Resources Assessment, generated by the NH Division of Forests and Lands in 2010, the state experienced a historical trend of forestland decline associated with settlement into the late 1800's, followed by a consistent reforestation trend into the late 1980's. The study found that since 1997, New Hampshire has lost 148,000 acres of forestland to development and other land uses (Figure 5), and projects the state to lose another 288,000 acres by 2025, resulting in a 5% loss of state forestland.

[Photo Credit: UNH Cooperative Extension]

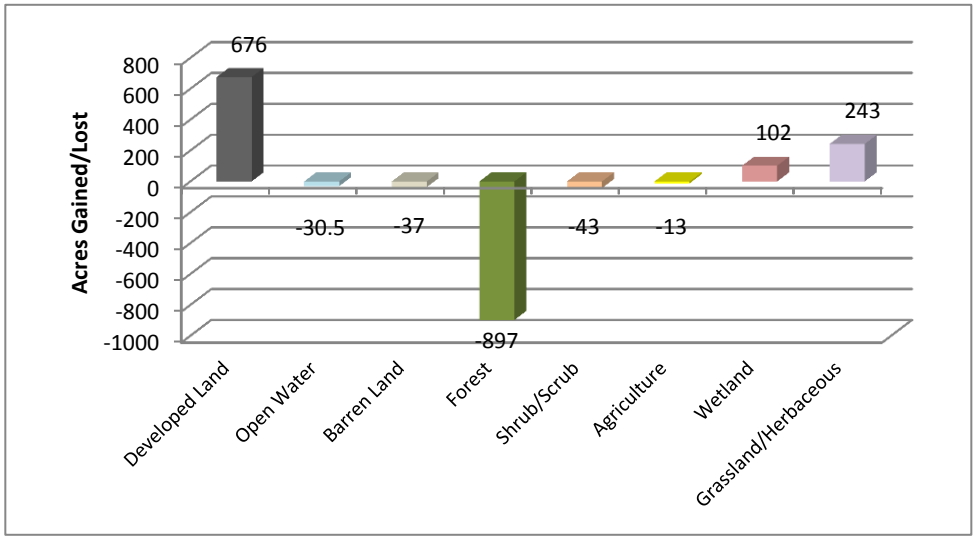
Figure 5 - Forest Land Change and Projection (1630 - 2025)



Source: USDA Forest Service, Forest Inventory and Analysis & SPNHF, NH's Changing Forest Landscape

After a comparison of land cover change data obtained from both the 2001 and 2006 U.S. Geological Survey's (USGS) National Land Cover Datasets (NLCD), a 16-class land cover classification scheme with a spatial resolution of 30 meters based primarily on decision-tree classifications of circa 2001 and 2006 Landsat satellite data, shows that the SRPC service area gained 178.12 acres of forestland and simultaneously lost 1075.48 acres of forestland, resulting in a total loss of approximately 897 forestland acres during the 5 year study period (Figure 6).

Figure 6 - Regional land cover acreage gained and lost (2001 - 2006)
[Data Sources: USGS National Land Cover Dataset 2001, 2006; NH GRANIT Political Boundaries, 2009]



In addition to the USDA's 1630–2025 forestland change and projection data and the comparison of both the 2001 and 2006 USGS NLCD datasets, SRPC's 2005 and 2010 land use update datasets were utilized to extract regional forestland-change data. Using the SRPC land use update datasets, the Forestland category (includes all forested areas over 5 acres, and some forest areas less than 5 acres under certain circumstances) was segregated from the full list of land uses. According to both datasets, the SRPC service area was found to include 224,663 acres of forestland in 2005 and 224,056 acres in 2010, a loss of 607 acres which represents a -0.27 acre loss during the 5 year study period.

Table 5 - Total Forest Land Change by Community (2005 – 2010)

Municipality	2010 Total Forest Land
Barrington	20,368
Brookfield	12,330
Dover	6,590
Durham	8,418
Farmington	17,560
Lee	6,947
Madbury	4,262
Middleton	9,469
Milton	15,993
New Durham	21,341
Newmarket	3,739
Northwood	13,035
Nottingham	22,369
Rochester	14,142
Rollinsford	2,075
Somersworth	2,287
Strafford	24,229
Wakefield	18,902
TOTAL	**224,056**

[Data Sources: 2005/2010 Land Use data digitized by SRPC staff - CTAP]

Table 6 - Protected Forest Lands

Municipality	Total Town Acres	Forest acres Protected	Town Forests Acres
Barrington	31117.2	3233.004	48
Brookfield	14880.3	2357.261	-
Dover	18592.1	1650.245	-
Durham	15852.2	4238.084	-
Farmington	23639.9	1809.991	50
Lee	12927.2	1931.943	97.3
Madbury	7799.0	1301.034	-
Middleton	11842.9	2192.173	-
Milton	21935.8	2914.222	FWD email
New Durham	28053.8	1260.369	137
Newmarket	9080.3	1069.827	-
Northwood	19356.9	2500.764	255.9±
Nottingham	30996.6	7385.364	-
Rochester	29080.6	895.291	-
Rollinsford	4842.8	424.880	-
Somersworth	6398.3	239.967	-
Strafford	32778.8	6579.597	689.9±
Wakefield	28717.1	765.359	45
TOTAL	347891.8	**42749.375**	

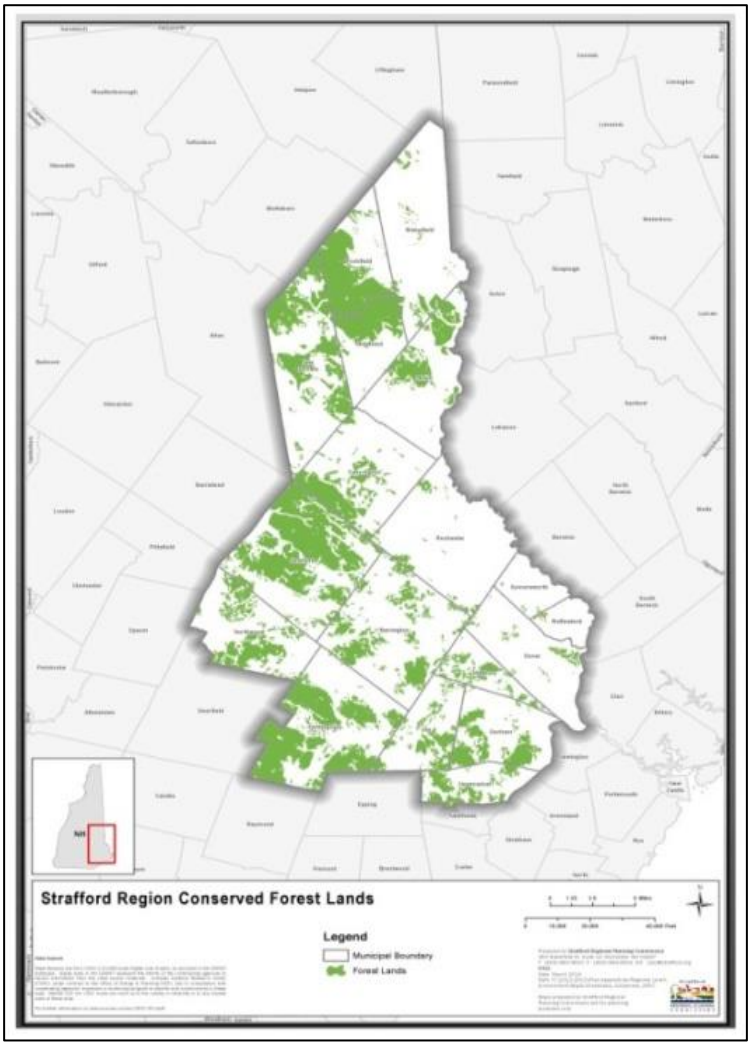
[Data Source: 2010 Land Use data digitized by SRPC staff – CTAP, NH GRANIT New Hampshire Political Boundaries]

In addition to the protected forestland data, the existence and acreage of regional Town Forests within SRPC communities was gathered during data collection procedures. According to available municipal Forest Management Plans, Conservation Plans and a variety of other sources, there are 7 Town Forests within the SRPC service area, totaling 1,322 acres.

The bureaus and programs within the New Hampshire Division of Forests and Lands focus on protecting and promoting the importance of sustaining New Hampshire's forestry resources. In addition to state forestry programs and services documented in previous sections, several other organizations exist which deserve recognition for their forestry protection efforts, promotion of forest management practices, and dedicated assistance to keeping our forests healthy. Areas of conserved forest land are shown below in Figure 7.

[Photo Credit: geocaching.com]

Figure 7 – Conserved forest lands in the Strafford Region
Data sources: 2005/2010 land use data digitized by SRPC staff - CTAP



The American Forest Foundation (AFF) focuses on keeping America's forests sustainable for present and future generations to enjoy[15]. The American Tree Farm System (AFTS) is a network of 82,000 family forest owners who manage 24 million acres of forests. AFTS provides forest owners with the necessary resources to maintain their forests[16]. As an application of the AFTS, the NH Tree Farm Program which seeks to encourage the growing and harvesting of forest resources while still protecting the environment and educating the public about the advantages of forestry practices[17].

Timber harvesting laws are carried out through the Forest Protection Bureau under the Division of Forests and Lands (RSA 227:G:3). The following list below provides accessibility to timber harvesting forms and information sheets.

- Basal Variance Request form – available for loggers, foresters or landowners who want to have permission to harvest 50% of the Basal Area, the tree density in a given area of land. The Intent to Cut form is for loggers, foresters or landowners who are interested in forest harvesting.
- The Notification of Forest Management or Timber Harvest Activities having Minimum Wetlands Impact – applies to loggers, foresters, and landowners who wish to harvest timers in areas that will have an impact on wetland areas.
- Timber Harvest Driveway Permits – available for loggers or landowners who intend on having vehicles enter a state road from the harvest site.
- BMPs for Erosion Control on Timber Harvesting Operations Reference Manual – informs loggers, foresters, and landowners about management practices for timber harvesting
- Harvesting Around Wetlands Information Sheet – overview of wetland habitats and forest management strategies in those habitats
- Timber Sale Guidelines Sheet – information for landowners who plan to have timber harvested from their land
- Timber Sale Agreement Sheet – information for a timber sale agreement with a sample contract included
- New Hampshire's Licensed Foresters Information Sheet – overview of the requirements for licensed foresters
- Selecting a Forester Information Sheet – overview of the services provided to a landowner by a licensed forester[18]

The Guide to NH Guide to Forestry Laws gives an overview of all the Timber harvesting laws.

- The Basal Area Law states that forested buffers should be left along town and state roads, streams, and bodies of water after a timber harvest.
- The Slash Law states that no logging slash (remaining debris – branches, leaves or stems) may be left after a timber harvest.
- The Timber Trespass Law protects landowners from theft or irresponsible timber harvesting that may occur without their permission.
- The Deceptive Forestry Business Practices Law requires that all timber harvesting that needs "Intent to Cut" must have a contract which discusses payment processing and costs for the harvest.
- The Timber Tax Law states that 10% of the timber sale must be returned to the state in which the timber was harvested.

Existing and Future Forestry Markets & Relation to the State Economy

According to the North East State Foresters Association (NESFA), New Hampshire's forests cover over 4.8 million acres of land (84% of State's land area). The USDA Forest Service found the majority of the state's forest cover (over 50% or 2.4 million acres) to be comprised of Northern hardwoods (beech, birch, and maple), with the remainder consisting of roughly 560,000 acres of pine (mostly white), nearly 660,000 acres of fir, spruce, aspen and birch trees, and over 1 million acres of trees categorized as "other".

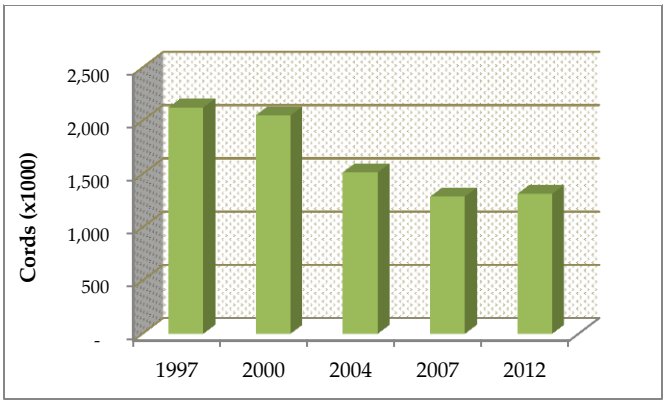
[Photo Credit: Arbor Day Foundation]

In addition to the providing critical wildlife habitat, clean air and water, recreational opportunities, watershed services, and carbon storage, New Hampshire's forests provide a renewable economic resource used to create products from furniture and hardwood floors to fuel and paper, which brings in close to $1.4 billion dollars annually[19]. One of the oldest industries in the state, forest products manufacturing not only includes forest harvesting and management operations, but is comprised of all associated businesses from trucking and transport components, to raw material processing and power supply.

Forests provide a number of ecosystem services - or benefits to people - that enable high quality of life in the region. These include: provisioning services that can be extracted from nature (timber), regulating services or process that moderate natural phenomena (water purification, carbon storage and climate regulation), cultural services or non-material benefits that contribute to the development and cultural advancement of people (recreation), and supporting services that sustain ecosystems (photosynthesis, nutrient cycling).

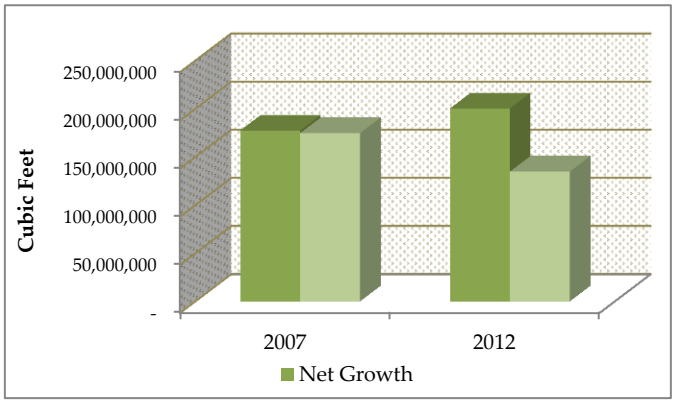
According to the USDA Forest Service, the state's 2007 net tree growth and removal data were nearly even with 174.7 million cubic feet removed and 177.4 million cubic feet net growth. The data also show that in 2012 the net tree growth was at 200.4 million cubic feet while the removal rate was approximately 134.8 million cubic feet (Figure 8). From 2007 to 2012, the state experienced a 22.7% decline in the amount of tree removals and a 12.9% increase in the amount of tree growth. As is the case with many other manufacturing industries in the U.S. economy during the past 15-20 years, the state's timber harvest volume has dropped significantly since 1997. According to the NH Division of Forests and Lands and NEFA, the volume of timber harvested in New Hampshire has decreased from over 2 million cords in 1997 to under 1.4 million in 2012 (Figure 9), representing a 37.8% reduction.

Figure 8- Volume of Wood Cords Harvested in NH [Data Source: NH Division of Forests & Lands and NEFA]



The use of wood as the main source for heat among Americans living in the Mid-Atlantic and Northeast has increased by at least 50% between 2005 and 2012 according to the Energy Information Administration. Many New Hampshire residents also rely on wood products as their primary source for home heating, which was found to be approximately 8% of the state's population according to the U.S. Census Bureau's 2011 Community Survey.

Figure 9 - NH Forests Growth vs. Harvest Rates for 2007 and 2012 [Data Source: USDA Forest Service, Forest Inventory and Analysis]



New Hampshire currently has a total of seven operating biomass power plants which generate renewable electricity, with an eighth plant scheduled to commence operation in 2014. Of the eight state biomass power plants, one is located on the UNH campus in the Town of Durham (UNH 7.9 MW Plant), and the second is located in the City of Rochester (Turnkey Landfill Gas Recovery). Wood-fired biomass power plants are a reliable source of renewable energy because the fuel they utilize to function replenishes itself, and can run at any time without the concern of weather conditions (sun, wind, etc.). These plants burn wood chips and other low-grade wood products producing steam to power a turbine which creates electricity[20].

Between 2001 and 2011, the number of NH jobs in forestry, logging, and trucking, declined from 1,665 to 1,359. This reduction in forestry, logging and trucking jobs within the study period represents an 18% loss of jobs within these sectors of the state's forestry market.

The U.S. Department of Commerce, Bureau of Economic Analysis, found that the number of wood manufacturing jobs in New Hampshire declined from 4,336 jobs in 1998, to 1,996 jobs in 2011. This reduction represents a 54% loss of jobs within this sector of the state's forestry market during the 14 year study period. A contributing factor to this drop in wood manufacturing jobs during the 13 year study period is that worker productivity was found to have increased tremendously. The Bureau of Economic Analysis found that in 2011, it took 30% fewer workers to produce the same value of wood products as was required in 1997.

As is seen with the logging, forestry, trucking and wood manufacturing sectors, the New Hampshire paper manufacturing sector has experienced heavy job losses since 1990. According to the U.S. Department of Commerce,

Bureau of Economic Analysis, the state's paper manufacturing industry experienced a 78.3% loss of jobs between 1990 and 2010.

The forestry products industry in New Hampshire has seen a decline in timber harvest rates, and in the number of forestry, logging, trucking, wood and paper manufacturing jobs as shown in the figures above. It's important to note that not all wood harvested in New Hampshire stays in New Hampshire for processing, and not all wood processed in New Hampshire comes from state forest resources, as states have no authority to regulate the movement of wood products while they flow freely throughout the region and its economy. Despite the decline in forestry demographics, this state industry is still vibrant and contributing a great deal to the state and regional workforce, and economies, while successfully maintaining forest lands for future generations.

Managing the many pressures on our forests – from paper product needs and the growing demand for wilderness and recreation areas, to the conversion of woodlands to developed metropolitan areas – maintaining this natural resource into the future depends on the presence of a healthy state forest products industry, and an incentive to private landowners to keep their lands undeveloped and harvestable. The fact that 80% of the state's forestlands (3.6 million acres) are under private ownership[21] supports the need for maintaining these incentives.

Regional & Local Grassroots Initiatives

In addition to management and promotion of the nation's forestland by federal and state agencies, several volunteer and non-profit groups throughout the region and state advocate for forest protection, provide public education, and provide governments with input from a traditional grassroots perspective unique to New Hampshire. One such organization, the Society for the Protection of New Hampshire Forests (SPNHF) has been working to protect important forest lands since 1901. One of the country's most effective statewide land conservation organizations, SPNHF has assisted with the protection of over 187,000 acres of land on 991 properties throughout the state. The Society also assists land trusts, municipalities, federal and state agencies and other conservation groups with efforts to protect lands throughout the state and actively advocates for the use of renewable resources. Table 7 below lists the properties within the SRPC service area which have been protected through SPNHF[22].

Table 7 - Society for the Protection of New Hampshire Forests (SPNHF) Projects

Town(s)	Reservation Name	Total Acreage	Year(s) Protected
Durham	Dame Forest	116	2003-2008
Durham & Madbury	Hills Family Farm	129	2008
Farmington	Tebbets Hill Reservation	177	2006
Madbury	Grandpa Watson's Woodlot	22	2008
Middleton & Brookfield	Moose Mountain Reservation	2,322	2005-2006
Milton	Jones Forest	237	1975
Milton	Salmon Falls Reservation	284	2008
New Durham	Cooper Cedar Woods	136	1968-1998
New Durham	Jennings Forest	396	1968-1998
Rochester	William H. Champlin, Jr. Forest	185	2006

[Data Source: SPNHF]

Regional Outdoor Recreation & Culture

New Hampshire's landscape is rich with natural and cultural attractions, including over 9,000 square miles of land area and 5,900 square miles of shoreline and riverfronts. This land provides a variety of outdoor recreation opportunities for residents and tourist alike. Several recreation opportunities exist within the region including hunting, fishing, wildlife sight-seeing, hiking, biking, camping, rock climbing, snowmobiling, snowshoeing, boating, swimming, horseback riding, ATV use, playing sports, visiting parks, playgrounds, natural areas, historical and archeological sites, and attending outdoor concerts and festivals.

[Photo Credit: Flickr.com – Pawtuckaway State Park]

The purpose of this section is to highlight regional opportunities for recreation, existence of cultural attractions and the relationship these resources have to the state's economy and tourism industry.

Recreational and Cultural Highlights & Protection Efforts

Under the Land and Water Conservation Fund Act (LWCF) of 1964, every state is required to establish a Statewide Comprehensive Outdoor Recreation Plan (SCORP) in order to protect special places and nature which provide benefits to local economies through the tourists they draw.

The New Hampshire Statewide Comprehensive Outdoor Recreation Plan (SCORP) is the state's official plan for outdoor recreational activities. The Plan addresses the issues that are associated with the state's recreation and natural resources and attempts to resolve them. Public outreach for the plan was performed by the New Hampshire Department of Resources and Economic Development (NHDRED) and the New Hampshire Office of Energy and Planning (NHOEP):

- The Carsey Institute at UNH – community discussions throughout the state
- The University of New Hampshire Cooperative Extension Service – planning sessions with stakeholders and web-based survey

Outdoor Recreation, Cultural, and Relation to the State Economy

The New Hampshire SCORP also addresses many of the economic benefits to outdoor recreation. Annually, Americans spend $646 billion on outdoor recreation. In New Hampshire, $4.2 billion is generated in consumer spending. Nationally, 6.1 million Americans have jobs associated with outdoor recreation; the state of New Hampshire has 53 thousand. Annually, approximately $4 billion is generated in outdoor recreation retail sales and services in New Hampshire. State parks contribute more than $500 million to New Hampshire's economy[23].

In addition to fostering health and well-being, providing access to recreational opportunities, recreation retail sales and services and state parks contribute to the local and state economy. Recreational opportunities also promote environmental stewardship.

Hunting & Fishing: As of 2006, there were 4,000 jobs, 159,000 resident anglers/hunters, 131,000 non-resident anglers/hunters, and an annual spending of $255 million – The US Fish & Wildlife Service 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation

Equestrian: Between 2002 and 2003, expenditures reached $61 million; $32 million was operating expenditures and $28.2 million was capital expenditures

Off-Highway Recreation Vehicles (OHRV): The total registrations have doubled within the past 10 years and out-of-state registrations have more than tripled. In the 2010-2011 seasons, the number of registrations was greater than 80,200. In 2011, registration revenues totaled to $5.2 million.

ATV Use/Trail Biking: Between 2002 and 2003, spending reached approximately $176 million with $124 million being direct and $52 million indirect spending.

Snowmobiling: From 2008-2010, snowmobile registrations declined; however, they increased in 2011 reaching 56,550 for the season. Net revenues totaled $3.1 million for the 2011 season.

Public Lands

There are seventy-five state parks in New Hampshire, with only two located in the SRPC service area (Pawtuckaway State Park in Nottingham and Northwood Meadows State Park in Northwood)

Pawtuckaway State Park
Nottingham, NH

- 5,600 acres of land
- 192 campsites (map)
- Activities include: biking, hiking, fishing, swimming, boating, playground, snowmobiling, xx country skiing, horseback riding, rock climbing, and camping

Northwood Meadows State Park
Northwood, NH

- 674.5 acres of land
- No camping
- Activities include: hunting, fishing, hiking, non-motorized boating, biking, snowmobiling, and cross country skiing

Camping

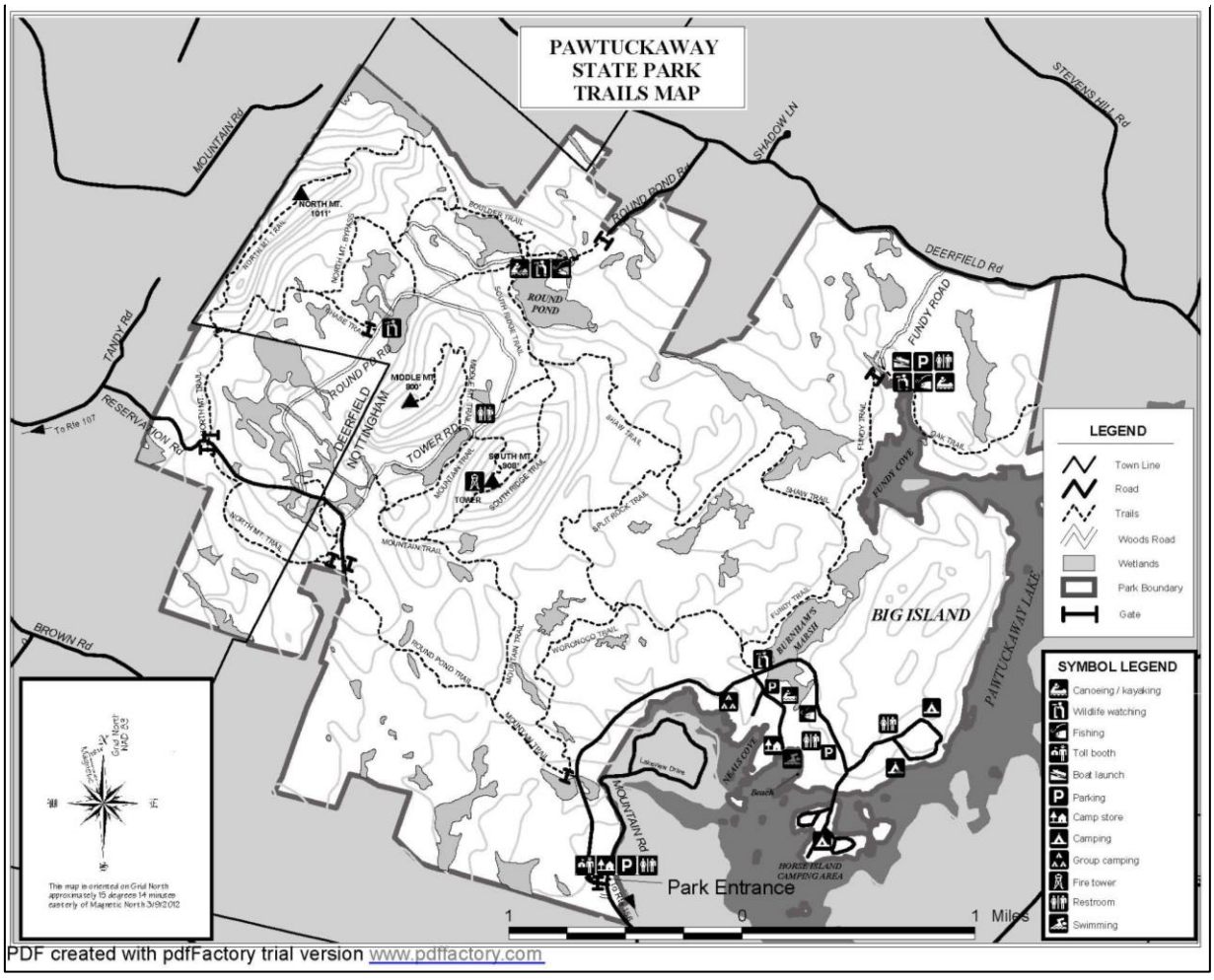
- Ayers Lake Farm Campground – Barrington
- Barrington Shores Lakeside Camping – Barrington
- Crown Point Campground – Strafford
- Ferndale Acres Family Campground – Lee
- Forest Glen Campground – Lee
- Lake Ivanhoe Campground & Inn – Wakefield
- Mi-Te-Jo Campground – Milton
- Old Stage Campground – Dover/Madbury
- Pawtuckaway State Park Camping – Nottingham
- Saddleback Campground – Northwood
- Wadleigh Falls Campground – Lee
- Wellington Camping Park – Lee

Since 1936, the Division of Parks and Recreation has been dedicated to the preservation of New Hampshire's lands and recreational trails. These lands are top destinations for families and individuals to visit for the enjoyment of New Hampshire's beauty and culture.

Hiking has always been a very popular outdoor activity for residents and tourists in New Hampshire. Strafford County contains 57 mountain summits and peaks. Pawtuckaway State Park has hiking trails (**Error! Reference source not found.**) that lead to the mountaintop fire tower, areas of marshland with wildlife iewing opportunities, and even a field of glacial erratics - boulders deposited by receding glaciers at the end of the Ice Age.

Northwood Meadows State Park is comprised of extensive wetland areas, a pond created by a dammed brook, comfort stations during the season and a network of trails which are not physically demanding and contain some sections which are handicapped accessible.

Figure 10 - Pawtuckway State Park Trail Map
[Data Source: NH Parks & Recreation]



Boating, Hunting and Fishing Opportunities

Both fresh and saltwater boating is a popular outdoor activity for many New Hampshire residents. The state contains more than 400 public boat launch sites on the 1.300 lakes and ponds located within its borders (Figure 11). These water bodies are home to many fish species including black crappie, bluegill, brown trout, eastern brook trout, eastern chain pickerel, hornpout, landlocked salmon, largemouth bass, rainbow trout, smallmouth bass, tiger trout, and white perch among others.

The presence of invasive aquatic plants is a threat to New Hampshire's lakes, rivers, and streams. Species such as Didymo ("rock snot"), milfoil, fanwort, water chestnut, purple loosestrife, and common reed pose the greatest threat in the state. Often when certain invasive species (such as Didymo) flourish, they are an indicator of deteriorating water quality and ecosystem health. Other species (such as common reed and Japanese knotweed) actively change native ecological relationships when they infest an area.

Didymo can be easily spread by boats, fishing gear, waders, and other gear that may come in contact with algae-infested waters. Therefore, it's critical for people to be diligent about cleaning off their boats and gear after leaving a waterbody. Similar to Didymo, milfoil has become an economical and recreational issue in the waters of New Hampshire as it spreads rapidly and out-competes native species. Of the eighteen communities in which the Strafford Regional Planning Commission services, milfoil has been found in the waters of two towns – Northwood Lake, Northwood and Mountain Pond, Brookfield[24].

Hunting and Fishing - With millions of acres of wildlife habitat terrain and waterways, New Hampshire's landscapes provide exceptional hunting and fishing opportunities and experience for many. Nearly all of New Hampshire's lands are open for hunting per owner permission, and most waterbodies are open to fishing under certain regulations.

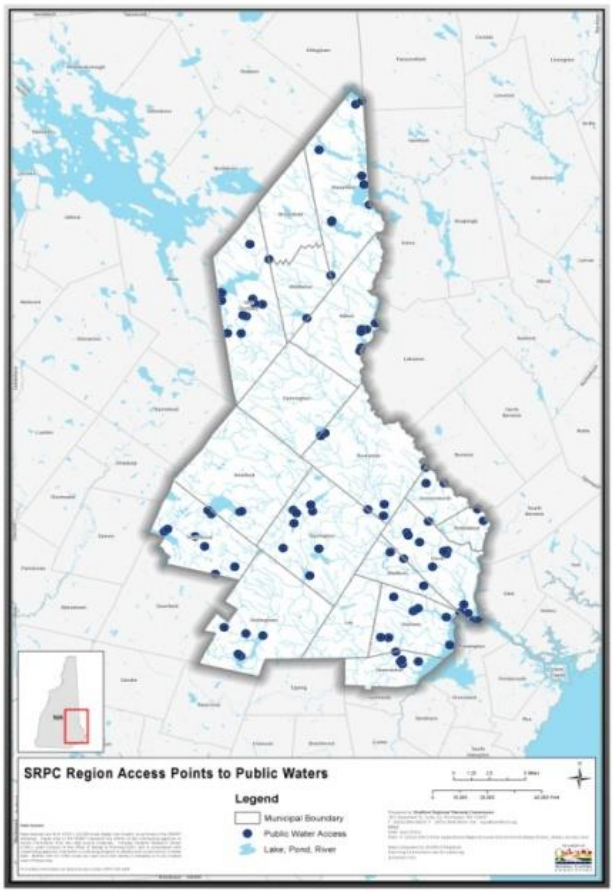


Figure 11 - Access Points to Public Waters [Data Source: GRANIT]

For the New Hampshire 2013 season, the total black bear harvest was 570 individuals which was a 30% decrease from 2012 numbers. The number of human-black bear conflicts has decreased by 54% from 2012. This reduction corresponds with the more abundant natural food supplies for black bears during the summer months. Table 46 shows the regional black bear harvests for 2013.


Photo: NH fish and Game

The New Hampshire Fish and Game Department has kept state records for largest fish since 1911 and currently has ranks of weights and length for 35 freshwater fish and 142 saltwater/anadromous fish. Since the mid-1970s, the NH Fish and Game implemented a new program, the NH Trophy Fish Program, which rewarded participants for catching "trophy fish". These trophy fish must meet the minimum size and weight which are specific for each different species. If a trophy fish is submitted to the Fish and Game Department the angler receives either a Kept or Released Trophy Fish Patch. A certificate is given the angler who catchers the largest fish of the year within each species. While the program does allow anglers to showcase their skill, it also provides information to marine biologists that study fish in New Hampshire. All species of fish are accepted in this program and there is no age restriction as long as the fish has been caught in any legal way.

"Moose are facing a triple threat in our changing climate. Increasing temperatures, changing forest species, and increased mortality due to parasites may make it very hard to maintain a viable moose population in New Hampshire in the future."

– New Hampshire Fish and Game
Moose Biologist, Kristine Rines

Changes to the regional climate are having a significant effect on the health of distinctive New Hampshire wildlife. New Hampshire has seen a rapid decline in its moose population within the past decade from over 7,000 to its current estimate of 4,500 individuals. During the 22nd annual North Country Moose Festival sight-seeing tour, only one moose was spotted. Those observing this decline attribute it to a likely cause-and-effect: changing seasonal patterns are allowing more ticks to survive through the late winter till the spring melt. The effect on newborn and young moose is particularly dramatic. Enough ticks are attaching to young moose that they are unable to replace their blood fast enough. As the health of the moose population continues to decline, this means fewer slots in the annual moose hunting permit lottery. To fully understand the problem, a four-year study is being conducted by the New Hampshire Fish and Game Department and the University of New Hampshire to track moose via GPS collars (80-100 cows and calves)[25].

Ice-fishing - Specific rules exist for ice fishing season, beyond the purchase of a fishing license for individuals 16 years of age or older, regarding to the number of tip-ups (traps) that can be deployed at one time by a single angler, as well as which species are allowed to be harvested. Most water bodies in the state allow for six (6) tip-ups per individual, except for water bodies being managed for lake trout and salmon, and lakes that cross the border with Maine. Both Merrymeeting Lake in New Durham and Great East Lake in Wakefield are managed for lake trout and salmon, and therefore do not allow for the harvest of salmon, and require no more than two tip-ups per angler.

One of only 10 communities in New Hampshire known to host an annual ice-fishing tournament (held in early March), the Wakefield Parks and Recreation Department's tournament provides two separate tournament divisions for youth (under 16) and adults (16+) with the registration fees being $5 and $15, respectively. The winners are determined by the heaviest fish of each species listed in **Error! Reference source not found.** below, and can be caught n Lovell Lake, Great East Lake, Balch Pond, and Pine River Pond.

Fishing (spring-fall) - Each year there are over 400 fishing tournaments in New Hampshire with the majority of them taking place during the summer months. In SRPC communities alone there are over 70 bass fishing tournaments. Most of the tournaments are one day events, although they can span multiple days with some grand prizes totaling in the thousands of dollars. The scoring of these tournaments range from total weight of fish caught by a team to the single largest fish caught during the time period. Many of these tournaments encourage keeping the fish alive throughout the duration and urge anglers to release them once they have been weighed and counted.

New Hampshire contains many areas throughout the seacoast which offer shellfishing, including areas in Great Bay and Little Bay, located within the SRPC communities of Dover and Durham. Within these bays, there are only certain locations which allow for shellfishing due to areas being closed to harvesting. These closed areas may change from week to week based on water samples taken by the NHDES Shellfish Program. If the water samples contain toxin levels high enough to harm humans upon consumption, the area is closed until the water is at a safe level. There are certain regulations pertaining to harvest season for certain species, the number of individuals authorized for harvest, and whether or not a harvest license is required.

Located in New Durham, the Powder Mill Fish Hatchery provides more pounds of trout and salmon to lakes, rivers, in New Hampshire than any other hatchery in the state. In any given year just under 300,000 fish are stocked in New Hampshire water bodies of all varieties. During the busiest parts of the year three to four truckloads containing 2,000 pounds of fish are distributed daily around the state. This ensures that lakes within the Strafford region and communities throughout the state are well stocked with fish ready to be reeled in by anglers.

Water Resource Protection

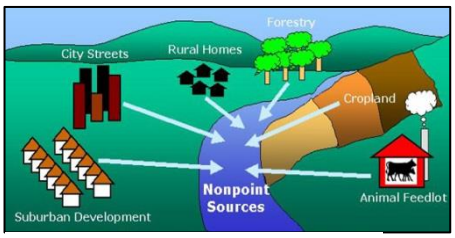
New Hampshire is considered one of the most water-rich states in the country. New Hampshire is one of the fastest growing states within the New England area, offering many tourism activities associated with its beautiful lakes, rivers, mountains, and coast. The economic well-being, public health, and quality of life in the region are highly dependent on the quality of its water resources; therefore it is of the utmost importance to preserve and protect this vital resource.

[Photo Credit: hercampus.com]

The purpose of this section is to provide information and insight into current water resources within the Strafford Region, highlight existing water protection efforts and best management practices, data resources and maps, and to identify initiatives that promote and sustain this essential resource.

Regional Water Resources

The state has approximately 17,000 miles of rivers and streams, 1,000 lakes and ponds, and 238 miles of ocean and estuarine shoreline. Although the state's waters are relatively clean, many threats remain, including development pressures, point and non-point source pollution. Non-point sources, such as fertilizers, oil, grease, improperly managed sediment and bacteria from animal waste are the main contributors to water pollution in the region and will be further discussed in the Water Infrastructure Appendix.



[Photo Credit: University of Maine]

Major Watersheds - Within the SRPC service area, there are four major watersheds, and several smaller watershed areas, which ultimately drain to the Atlantic Ocean and contain a myriad of irreplaceable natural and cultural resources. The four major watersheds that encompass the region include: the Cocheco River Watershed, the Salmon Falls River Watershed, the Lamprey River Watershed and the Great Bay Drainage.

The **Cocheco River Watershed** spans 185 square miles within the SRPC service area. This drainage area includes the towns of New Durham, Milton, Farmington, Strafford, Barrington, Rollinsford, and the cities of Somersworth, Rochester and Dover.

The **Salmon Falls River Watershed** spans 188 square miles within the SRPC service area, with approximately 21% of the service area being located within its bounds. This drainage area includes the towns of Brookfield, Wakefield, Middleton, Milton, Rollinsford, and the cities of Rochester and Somersworth.

The **Great Bay Drainage Area** spans 74 square miles within the SRPC service area, with approximately 14% of the service area being located within its bounds. This drainage area includes the tows of Barrington, Lee, Madbury, Durham, Nottingham, Newmarket and the City of Dover.

The **Lamprey River Watershed** spans 95 square miles within the SRPC service area, with approximately 17% of the service area being located within its bounds. The drainage area includes the towns of Northwood, Nottingham, Barrington, Lee, Newmarket, and Durham.

For more information on water resources and protection measures, see the Water Infrastructure Appendix.

Currently, there are six watershed management plans for the following watershed areas within the SRPC service area (Table 8). These management plans are in place to identify the major causes and sources of impairment, and work to identify the water quality goals and practices to appropriately meet water quality standards for pollutant loads that threaten the integrity of a watershed.

Table 8 - SRPC Region Watershed Management Plans

Town/City	Plan Name
Dover	Berry Brook Watershed Management Plan
Dover	Watershed Restoration and Implementation Plan for Cocheco River
Dover	Willand Pond Engineering Review: Summary of Watershed Assessment and Alternative Analysis
Farmington	Preliminary Assessment and Conceptual River Restoration Plan for the Mad River Between NH Rt. 11 and Tappan St.
Nottingham	Pawtuckaway Lake Watershed Based Plan
Wakefield	Salmon Falls Headwater Lakes Watershed Management Plan

Floodplain Areas - Understanding riverine geomorphic characteristics related to human-caused and natural disturbances is vital to the management, preservation, and restoration of rivers and streams. The New Hampshire Geological Survey has focused their efforts on the state's flooding risks; therefore, creating the fluvial erosion hazard program which led to the development of the Geologic Hazards Assessment Program. Fluvial erosion, having several implications both for water resources and land use, is the term used for when flowing water wears away river beds and banks. Several rivers within the region have undergone fluvial erosion hazard analyses (Table 8).

A floodplain is the low, flat, periodically flooding area near rivers, lakes, ponds, and oceans. These areas provide flood storage as well as vital habitats for many species. For agricultural purposes, these areas are commonly used for their rich soils; however, floodplains should remain in their natural condition for capturing water runoff and storing floodwaters.

Role of Floodplains:

- Floodwater storage
- Erosion control
- Maintain water quality
- Increase biological productivity
- Provide breeding/feeding grounds for many organisms
- Provide recreational opportunities

The National Flood Insurance Program is a federal program which helps communities financially protect themselves from flooding damages. Currently, all communities in the region are involved in FEMA's National Flood Insurance Program.

One major contributor to flooding events is impervious surfaces. Impervious surfaces are areas covered by material that prevents water infiltration such as buildings, pavement, concrete, and compacted soils. These surfaces can affect water resources in several ways:

- Alteration of natural water flow – increased water volume during storm events
- Aquatic habitat loss – bank erosion and altering of channel shape
- Reduced water quality – increased stormwater volume leads to an accelerated delivery of pollutants
- Loss of biological diversity – stress on aquatic organisms

Major Surface waters – The State and regions surface waters (rivers, lakes and ponds) provide vital wildlife habitat, offer several recreational opportunities, and are a major tourist attraction which contributes a great deal to the local and state economies. The SRPC service area contains several major rivers, lakes, and waterfront areas. Within the region there are five major rivers: the Bellamy River, the Cocheco River, the Isinglass River, the Lamprey River and the Oyster River.

The **Cocheco River** runs through the communities of New Durham, Middleton, Farmington, and the cities of Rochester and Dover. Approximately 38 miles of the river exist within the SRPC service area. The Cocheco has been analyzed by the NHDES for Fluvial Erosion Hazard Areas (see Table 8).

The **Isinglass River** runs through the communities of Strafford, Barrington and Rochester.

The **Lamprey River** is the longest river in the region running 50 miles south through the communities of Northwood, Lee, Durham and Newmarket.

The **Oyster River** runs south through the communities of Barrington, Lee, Madbury and Durham.

The **Bellamy River**, a tributary of the Piscataqua River, runs through the communities of Barrington, Madbury and the City of Dover. The Bellamy River is approximately 17 miles in length.

The New Hampshire Department of Environment Services has composed a list of ponds and lakes in the State of New Hampshire. Several of these water bodies are considered great ponds — a natural water body that is at least 10 acres. Within the Strafford region there are a total of 54 great ponds. The towns of Barrington and Nottingham hold the top positions with the greatest number of great ponds in the region (10 each). The runner ups are Northwood and Wakefield with 8 ponds each. Most of the other communities have at least one great pond each with the exception of Farmington, Newmarket, Rochester and Rollinsford[26].

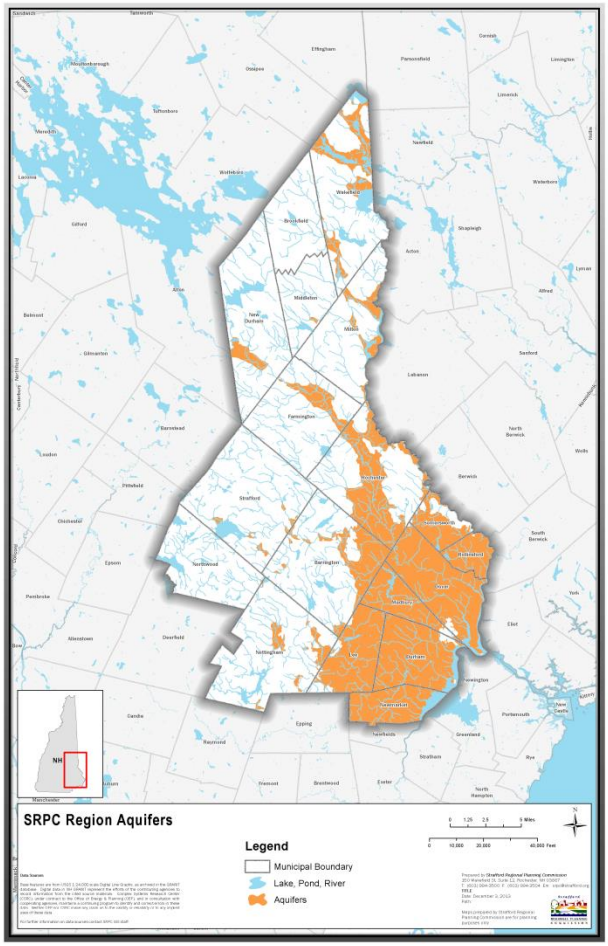


Figure 12 - Aquifers in the Strafford Region [Source: Data from GRANIT, map created by SRPC staff]

Aquifer Areas - Glaciers once dominated much of New Hampshire's land cover; however, over time these glaciers started to recede leaving behind sand and gravel deposits. These deposits are known as stratified drift which become the foundation of stratified drift aquifers. Though these types of aquifers are effective in water transmission; they are highly susceptible to contamination from leaking underground storage tanks, poor septic systems, and inadequate disposal of hazardous materials, and road salt applications. The map below shows that 30% of the region is covered by stratified drift aquifers.

Stratified Drift: sorted and layered unconsolidated material in meltwater streams flowing from glaciers or settled from suspension in quiet-water bodies fed by meltwater streams

Bedrock Aquifer: a geologic unit or rock formation that contains a supply of water for usable by people.

Stratified-drift Aquifer: a course-grained sand or sand and gravel deposit that contains and accessible and usable water supply for people.

The preservation of these aquifers is vital to avoid pollution of the region's public water resources. Two-thirds of the region (12 communities) addresses aquifer protection within their Zoning Ordinances.

New Hampshire Rivers Management and Protection Program (RMPP)

Established in 1988, the Rivers Management and Protection Program (NH RSA 483) was created to protect certain Designated Rivers, due to the outstanding cultural and natural importance to the region and state. Designated rivers are selected for protection and management because of their natural and cultural value and resources[27]. The program is administered by the New Hampshire Department of Environmental Services (NHDES), and the SRPC, in cooperation with local watershed associations and river management committees, works to navigate the River Nomination process, which is in place to delineate the river's values and features. With support from the community's residents and officials, the nomination is submitted to the DES Commissioner for approval. Once designated, a volunteer Local River Management Advisory Committee (LAC) is formed with the responsibility of developing and implementing a River Management Plan aimed at identifying and protecting the outstanding features of the river.

The Strafford Regional Planning Commission has been fortunate to have worked on four successful River Nominations under the Rivers Management Program (RMPP) and been able to assist in the drafting of the associated River Management Plans (see below).

New floodplain maps provide communities with information about current flood risks. Promoting development outside of the 500 year floodplain will decrease risk flood risk in the future and promote resiliency to climate change.

Strafford Region Designated Rivers

Cocheco River 2009

The Cocheco River is a unique and important resource for our region and warranted designation to ensure protection of the river's natural resources, water quality, and wildlife habitats. In addition, the river provides many other services including its scenic beauty, historic character, and recreational uses. The river is a valuable community resource that benefits not only the communities through which it flows, but also citizens within its watershed and the region. Designation of the river has helped to bring citizens and communities together to develop an integrated strategy aimed at managing and protecting the river.

From fall 2007 through June 2008, the Strafford Regional Planning Commission (SRPC) worked cooperatively with the Cocheco River Watershed Coalition to develop the Cocheco River Nomination Report for a 34.8 mile segment of the river up for designation. The Nomination was submitted on May 30, 2008 to the NHDES Rivers Management and Protection Program (RMPP). On July 21, 2009 the Cocheco River was officially accepted as the state's 16th protected river (Figure 13)

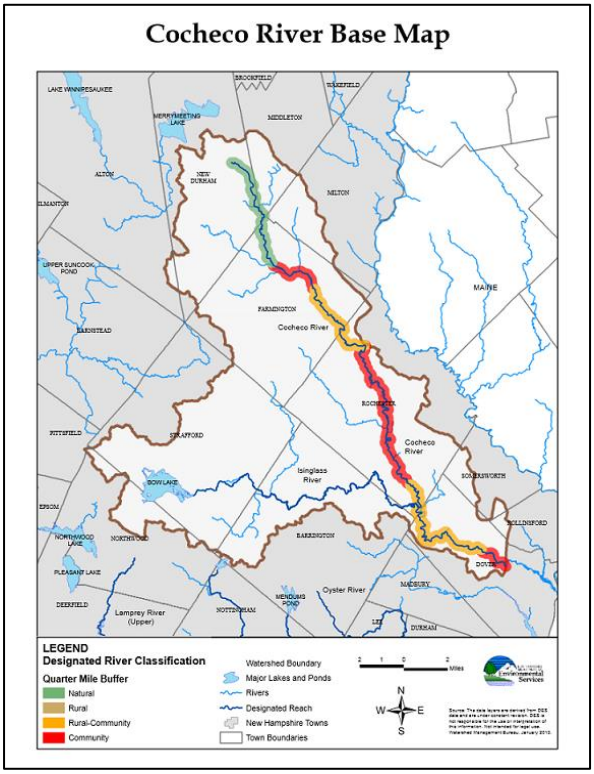


Figure 13 - Cocheco River watershed map [Data Source: NHDES WMB – January 2013]

Isinglass River 2002

In June 2002, the Isinglass River became one of 15 New Hampshire rivers to be designated by the Governor and Legislature of the State of New Hampshire as deserving of extra protection under the state's Rivers Management and Protection Program (RMPP).

The nearly 18 mile stretch of river was divided into three segments based on the land use and environmental characteristics of the river and its corridor. The segments include: **1) 0.54** mi within the Town of Strafford from the outflow of Bow Lake Dam to an area immediately downstream of the Route 202A bridge. **2) 5.75** mi from an area immediately downstream of the Route 202A bridge in Strafford to an area immediately upstream of the Route 126 bridge in the Town of Barrington. **3) 11.64** mi from the area immediately upstream of the Route 126 bridge in the Town of Barrington to the confluence with the Cocheco River in the City of Rochester.

SRPC completed the Isinglass River Management Plan for the Isinglass River Local Advisory Committee (IRLAC) in coordination with the NHDES Rivers Management and Protection Program. The plan addresses environmental and land use issues within the river corridor and watershed.

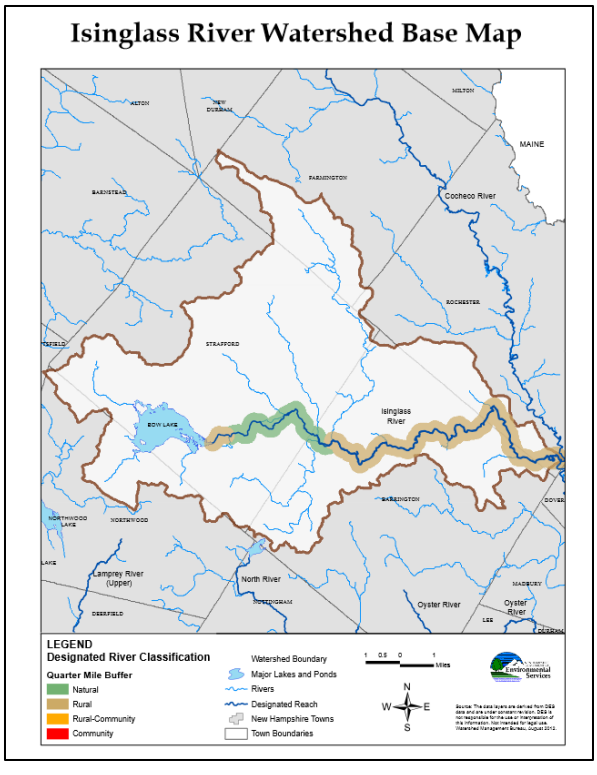


Figure 14 - Isinglass River Watershed map [Data Source: NHDES WMB – August 2012]

Lamprey River 1990

The Lamprey, North Branch, North, Little, Pawtuckaway, and Piscassic rivers are all part of the Lamprey River watershed (totaling 87.7 miles), which runs through fourteen New Hampshire municipalities and is the largest tributary system to the Great Bay Estuary.

In 1990, a 12 mile section of the Lamprey River's main stem through the towns of Lee and Durham was designated into the NHDES Rivers Management and Protection Program (RMPP), with the same section being designated under the National Wild and Scenic Rivers System in 1996. In 2000, the section of river designated under the National Wild and Scenic Rivers System was expanded to contain a large portion of the Lamprey's main stem within Newmarket and
Epping. During 2011, the Lamprey River and all five of its tributaries (North Branch, North, Little, Pawtuckaway, Piscassic) were designated by the New Hampshire Management and Protection Program (RMPP). Having all portions of the Lamprey River and its major tributaries being designated allows for all fourteen communities within the Lamprey River Watershed to participate in protecting the area's water resource (2013 Lamprey River Management Plan).

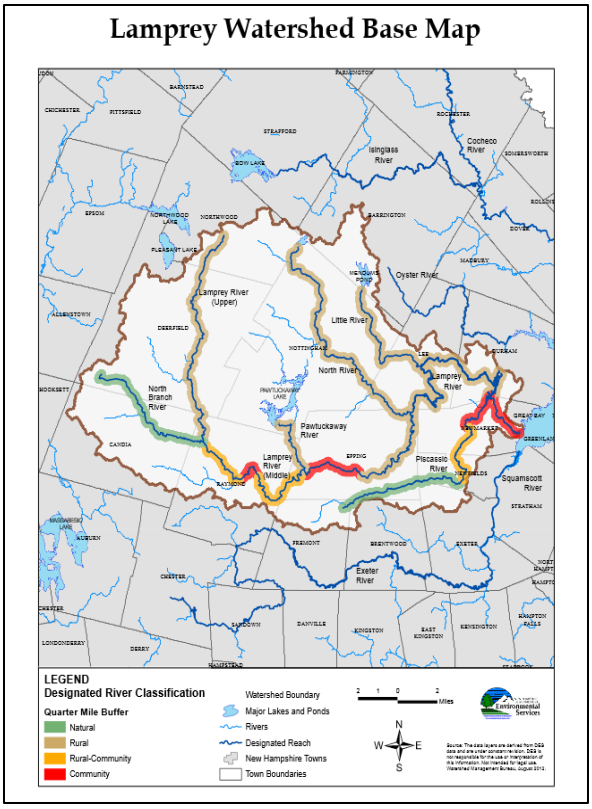


Figure 15 - Lamprey River Watershed map [Data Source: NHDES WMB – August 2012]

Oyster River 2011

The Oyster River and its watershed is part of the Great Bay Estuary, and is located entirely within New Hampshire. The Oyster River originates in the town of Barrington, and flows through the towns of Lee, Madbury and Durham before becoming tidal.

From the fall of 2009 through June 2010, the Strafford Regional Planning Commission (SRPC) staff and volunteers worked cooperatively with the Oyster River Watershed Association to develop the Oyster River Nomination in pursuit of state designation under the NHDES Rivers Management and Protection Program (RMPP). The section of the Oyster River nominated for designation (13.97 mi) begins near its source on Hall Road in Barrington, travels through the towns of Lee and Madbury, and terminates at the Mill Pond Dam in Durham where the tidal change begins. The nomination, which was submitted to NHDES on May 27, 2010, did not include the tidal portion of the Oyster River. In January of 2011, the NH General Court officially adopted legislation that designated the Oyster River for inclusion in the NHDES RMPP.

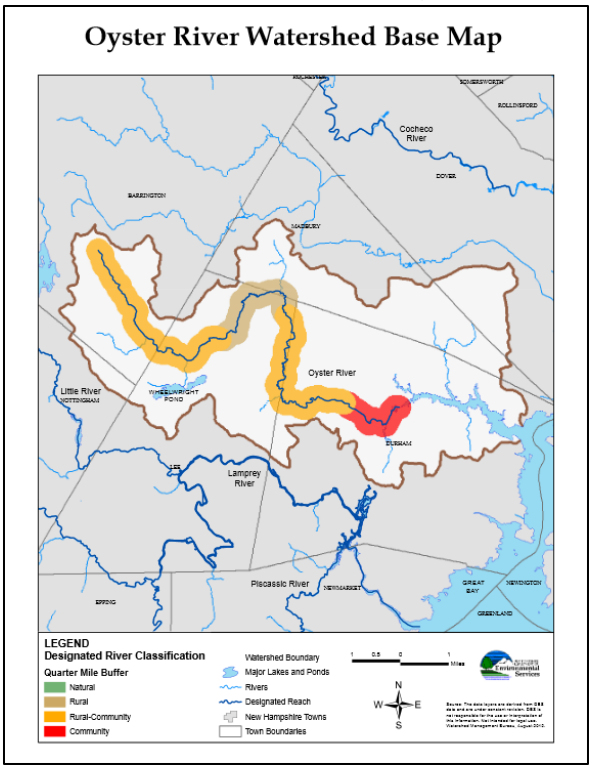


Figure 16 - Oyster River Watershed map [Source: NHDES WMB – August 2012]

Regional Bridge and Culvert Assessment Program

The Strafford Regional Planning Commission (SRPC), in partnership with the New Hampshire Geological Survey (NHGS), has created the Regional Culvert Assessment Program aimed at collecting stream crossing data for SRPC's member communities using the NHGS's Stream Crossing Assessment Protocol. The program is in place as a planning tool used to collect and verify stream crossing data for communities, and other interested parties, to use during the identification and prioritization of stormwater infrastructure in need of repair or replacement. Ultimately, SRPC hopes to assist communities in the reduction of road closures and associated property damage due to flooding and infrastructure failure. Starting in 2014, SRPC collected culvert data under the Statewide Asset Data Exchange System (SADES). This program arose from the need for statewide asset data that are uniform, accurate, and accessible to anyone with an internet connection and basic software for viewing data and maps.

Culvert and bridge locations are determined using NHDOT's New Hampshire Roadway layer, which is overlayed on top of the National Hydrography Dataset (NHD) flow-line data layer. During these comparison procedures, a shapefile is created by placing a point wherever the roadway line data intersects with the stream line data. The data collection methodology is modeling after the Vermont Stream Geomorphic Assessment (VSGA), along with other New Hampshire sources[28].

Local Water Resource Highlights & Protection Efforts

The Federal Clean Water Act (CWA) sets regulations for pollutant discharges from point sources into the nation's waters. The EPA enforces the following water protection regulations:

- CWA Section 101: The purpose of this legislation is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters"
- CWA Section 319: Nonpoint Source Management Program – designed to manage sources of pollution that come from multiple, diffuse sources, as opposed to a single source such as an outflow pipe.

[Photo Credits: EPA]

The region's water resource stewards participate in a variety of committees and programs that utilize a variety of best management practices that protect and maintain the region's water quality. These BMPs include but are not limited to low impact development (LID), cluster development, and pesticide controls. Low Impact Development (LID) is a land planning design which seeks to manage stormwater runoff through many practices such as bioretention systems, dry wells, rain gardens, vegetated rooftops, rain barrels and permeable pavements. (For more information on LID BMPs: Protecting Water Resources and Managing Stormwater).

Regional LID Projects:

[Photo Credit: SRPC Staff]

- In 2001, Horne Street Elementary School in Dover received a Watershed Assistance Grant to construct rain gardens and tree filters on the school grounds[29].
- In Rochester, water quality restoration efforts (LID projects) have been made for Willow Brook through Section 319 funding including rain gardens, pervious concrete sidewalks, a porous asphalt basketball court (K-4 grade school), residential neighborhood catch basin and gutter stormwater conveyance and two tree filters)[30].

On top of LID, cluster development allows for residential or commercial development while still protecting the environment through open space. The buildings on the site are usually concentrated on a portion of the project lot with the remaining land undeveloped. The open space in these developments provide wildlife habitat, a filtering system for stormwater, and more natural drainage which leads to the reduction of stormwater runoff from impervious surfaces.

The objective of Groundwater Protection Best Management Practices (BMPs) is to prevent the discharge of a controlled substance into groundwater which can possibly contaminate drinking water[31]. Facilities that handle these controlled substances are identified in New Hampshire's Groundwater Protection Act (RSA 485-C).

Enacted in 1991, the Shoreland Water Quality Protection Act (RSA 483-B) sets regulations on the maintenance of New Hampshire's shorelands. Under this Act, the existing Shoreland Program provides many services and outreach efforts (for more details email NHDES Shoreland Program).

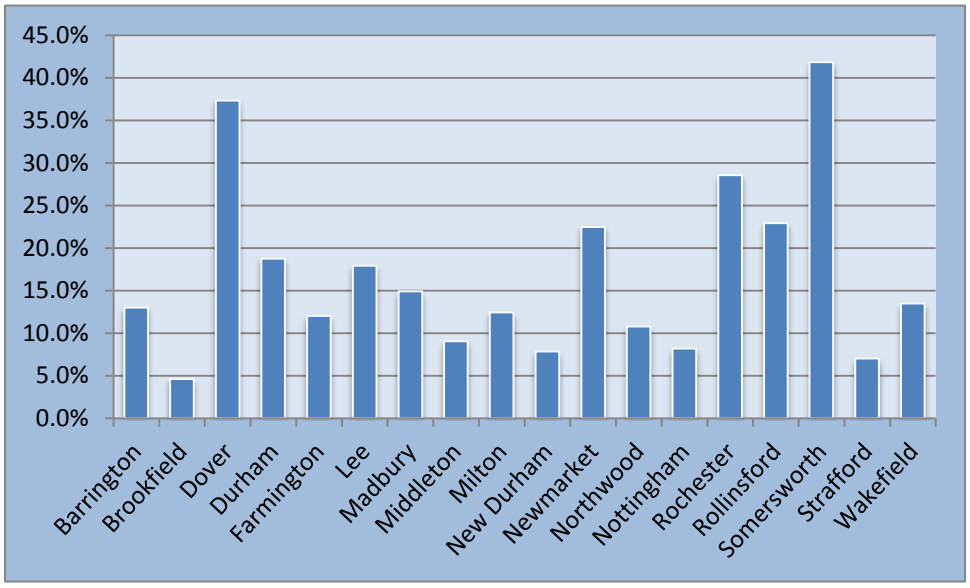
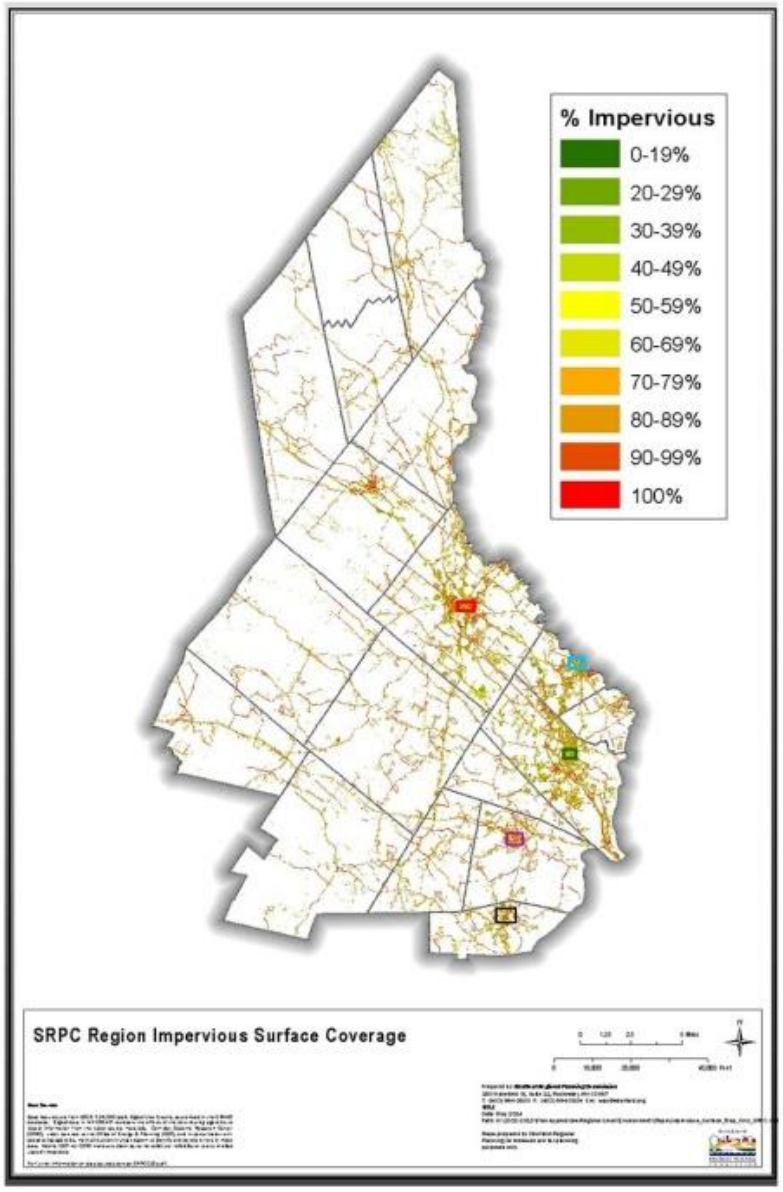


Figure 17 - Percent of town acres covered by impervious cover in 2010 [data source: GRANIT]

For more information on stormwater management, see the Water Infrastructure Appendix.



Rochester

Somersworth

Dover

Durham

Newmarket

[Data Source: NH GRANIT]

Regional & Local Grassroots Initiatives

Established in 1985, the NHDES Volunteer Lakes Assessment Program (VLAP) is dedicated to monitoring the water quality of New Hampshire's lakes. Throughout the summer, volunteers go out into the field to collect water quality data to detect early signs of problems. Annual water quality reports (Seacoast Region 2012 Report) are prepared to help visualize how water quality has changed and what it will be like in the future. As of 2012, there are nine VLAP lakes in the Strafford region including:

- Ayers Pond – Barrington
- Baxter Lake – Farmington
- Harvey Lake – Northwood
- Jenness Pond – Northwood
- Little Round Pond (Lake Ivanhoe) – Wakefield
- Northwood Lake – Northwood
- Pawtuckaway Lake – Nottingham
- Sunrise Lake – Middleton
- Willand Pond – Dover


Sunrise Lake, Middleton, NH

[Photo Credit: NHDES VLAP]

Established in 1998, a similar program known as the New Hampshire Volunteer River Assessment Program (VRAP) is dedicated to raising awareness and educating communities about water quality maintenance in New Hampshire's rivers and streams. Water quality data metrics include dissolved oxygen levels, pH, turbidity, specific conductance, and water temperature.

- Bellamy River Data
- Cocheco River Data
- Isinglass River Data
- Lamprey River Data
- Oyster River Data

[Photo Credit: SRPC]

Volunteer water quality monitoring programs provide community members with the opportunity to learn about water quality, participate in valuable scientific monitoring efforts, and become stewards of their watersheds.

Founded in 1978, through the UNH Cooperative Extension and the Center for Freshwater Biology, the NH Lakes Lay Monitoring Program (LLMP) seeks to preserve and thoroughly manage the state's lakes through local monitoring and research efforts. This program provides a great learning experience and employment opportunities for students to engage in.

The Oyster River Watershed Association (ORWA) is a non-profit organization that protects, promotes and enhances the environmental quality of the Oyster River watershed through public involvement. A grant was awarded to ORWA to nominate the Oyster River for designation under the State's River and Management Protection Program (RMPP). In June 2010, the Oyster River was nominated because it is an important source of drinking water for the University of New Hampshire and the Town of Durham as well as being a significant plant and wildlife habitat.

Established in 1983, the Lamprey River Watershed Association (LRWA) has sought to promote natural resource preservation and restoration of the Lamprey River Watershed. Water quality data is collected by NHDES through the Volunteer River Assessment Program (VRAP).

The Cocheco River Watershed Coalition (CRWC) was dissolved in March 2014[32]. The group was established in 1997, it sought to improve the environmental integrity of the Cocheco River watershed. All the CRWC assets have been passed on to Trout Unlimited. Cocheco River Local Committee

Southeast Watershed Alliance (SWA) provides assistance to New Hampshire coastal watershed communities to protect and restore its water resources. The UNH Stormwater Center and the town of Durham worked together to install a subsurface gravel wetland to reduce sediment, phosphorus, and nitrogen input into the Oyster River and Great Bay.

Founded in 1992, the non-profit organization, NH Lakes Association (NH LAKES), is the only statewide organization that seeks to protect all of New Hampshire's lakes and ponds through educational programs:

- Lakes Congress – education & networking event
- Lake Host Program – boat inspection program
- Lake Conservation Corps Program – lake landscaping program
- Summer Youth Employment Program for Lake Protection – program for financially-disadvantage & academically at-risk high school students
- Special Projects – rain barrel programs

One way communities are protecting their water resources is by using geographical information about floodplains and aquifers to create maps and write zoning ordinance that restrict development in sensitive areas (such as near a community's drinking water supply). Table 9, below provides some examples of such environmental protection at the local level.

Table 9 - Environmental Zoning Overlay Districts – Water Resources

Municipality	Aquifer Protection Ordinance	Wetland Conservation/ Water Quality Overlay	Floodplain Overlay	Shoreland Protection Overlay	Water Supply Protection Overlay
Barrington	✓ (stratified drift aquifer area)	✓(WDO)	✓(FDO)	✓ (SDO)	✓ (GPO)
Brookfield	×	×	×	×	×
Dover	×	✓	×	×	✓ (GPD)
Durham	✓(aquifer protection district)	✓	✓	✓	×
Farmington	✓ (aquifer protection district)	✓	✓	✓(waterfront protection)	×
Lee	✓ (aquifer conservation district)	×	×	✓	×
Madbury	✓ (aquifer/wellhead pro.)	✓	✓	✓	✓
Middleton	✓(aquifer protection district)	✓	✓	✓	×
Milton	×	×(ordinance)	×	✓	✓ (GPD)
New Durham	✓(aquifer protection overlay)	✓	×	✓	✓
Newmarket	✓ (aquifer protection overlay)	✓	✓	✓	✓
Northwood	×	✓	×	×	✓(wellhead protection)
Nottingham	✓ (aquifer protection district)	✓	✓	×	×
Rochester	✓ (aquifer protection zone)	✓	✓ (Reg. floodway zone)	×	×
Rollinsford	✓(aquifer conservation district)	✓	✓(flood hazard)	×	✓(well site protection district)
Somersworth	×	✓	✓	×	✓(GPD)
Strafford	×	✓	×	×	✓ (water protection overlay)
Wakefield	✓(aquifer conservation district)	✓	✓	×	×
Total	**66.7%**	**83.3%**	**61.1%**	**50%**	**55.6%**

[Data Source: Town of Barrington, NH Zoning Ordinance: Amended 3/13/12; Town of Brookfield, NH Zoning Ordinance: Amended 3/12/13; City of Dover, NH Code Chapter 170 Zoning: Amended 2/22/12; Durham, NH Zoning Ordinance: Amended 9/9/13; Town of Farmington, NH Zoning Ordinance: Amended 3/12/13; Town of Lee, NH Zoning Ordinance 2013; Town of Madbury, NH Zoning Ordinance: 4/22/09; Town of Middleton, NH Zoning Ordinance: Amended 9/6/06; Town of Milton, NH Zoning Ordinance: Amended 3/13/12; Town of New Durham, NH Zoning Ordinance: Amended 2/12/13; Town of Newmarket, NH Zoning Ordinance: Amended 8/4/10; Northwood, NH Development Ordinance: Amended 3/13/12; Town of Nottingham, NH Zoning Ordinance Regulations: Amended 3/12/11; City of Rochester, NH Chapter 42 Zoning: 2/22/10; Town of Rollinsford, NH Zoning Ordinance: Amended 05/2005; City of Somersworth, NH Chapter 19 Zoning Ordinance: Amended 7/15/13; Town of Strafford, NH Zoning Ordinance: Amended 3/13/07; Town of Wakefield, NH Zoning Ordinance: Amended 3/13/12]

Land Management and Biodiversity

Globally, human activities such as monoculture farming, urban development, and resource extraction are chipping away at vital natural spaces. Biodiversity is a term used by scientists to describe the variety plant and animal communities in a specific region. Measuring biodiversity in an ecosystem is a way to measure the overall health of the ecosystem – the greater the number of species a forest or estuary can support, the healthier and resilient the ecosystem. But ecosystem health isn't just important for trees, deer, and birds; the health of human communities also stems from healthy natural ecosystems. Healthy, bio-diverse ecosystems in New Hampshire offer many natural services:

[Photo Credit: NH Parks & Recreation}

- Water resource protection
- Soil protection
- Nutrient storage and recycling
- Climate stability
- Natural disaster recovery
- Food
- Health resources
- Forestry resources
- Recreational opportunities
- Education

The forested landscape of New Hampshire gives us free clean air and water, it provides fuel for heat, draws around $4 billion from tourism and outdoor recreation, and is a central part of why people love to live here. Maintaining ecosystem health and biodiversity in the region, and thus preserving vital natural services, will require more sustainable land use practices and natural resources stewardship.

According to the Livability Principle Matric Table 1), land management was third most discussed priority area within Strafford region community Master Plans (See Figure 1). Additionally, land management was found to be a priority area within the regional planning documents reviewed at frequency of just 29.36 (See Figure 2). The purpose of this section is to provide information and insight into the status of land management within the Strafford region. This section will highlight existing land management protection efforts, inform readers about the region's wildlife diversity, and identify negative influences on land and biodiversity.

The Coastal Zone Management Act (CZMA) fostered collaboration between the federal government and states to protect and manage our nation's coastlines by promoting sustainable development practices that balance the conservation and development of coastal resources. The NH Coastal Program provides funding and assistance to communities who attempt to protect water quality, restore coastal habitats, and help make their area flood and natural disaster-resistant. The Federal Coastal and Estuarine Land Conservation Program (CELCP) was established for the protection of ecologically important to protect ecological, historical, or recreational important coastal and estuarine habitats that are subject to conversion.

Invasive Species

Invasive species can be native or introduced from other regions or continents. For many reasons, species introduced from other continents often have the greatest impact on native ecosystems, food webs, and in some cases even human culture. For example, the American chestnut was once a king among trees in New England forests. These huge trees flowered late in the season, resisted early frosts, and provided food critical for wildlife survival during the winter. Chestnuts were also food for livestock and people in rural communities – featured in a classic holiday song that has diminished along with the trees. Beginning in the early 1900's, chestnut trees imported from Asia brought a blight

that jumped to native trees –which have no built-in resistance – and spread quickly. By the 1950's the species was effectively extinct from its native range[33]. The entire structure of New England forests has changed as a result. Currently, there are a total of 423 invasive species that call New Hampshire home[34]

As of March 2014, there are currently 11 Strafford region communities with known Hemlock Woolly Adelgid infestations (Figure 18). The New Hampshire's Forest Pest Advisory Group established the Action Plan to Restrict the Spread of Hemlock Woolly Adelgid within the State of New Hampshire, which can be used as guide for agencies and other interested personnel to manage and eradicate Hemlock Woolly Adelgid infested trees within the state. Some management options include: cut and destroy, cut and burn, bury, mulch and bury, use of pesticides, introduction of predatory beetles, and no action. By making the decision against eradicating the infested trees, the state can evaluate the infestation and its ability to adapt to New Hampshire's environment which allows for the needed research to understand how to better manage it.

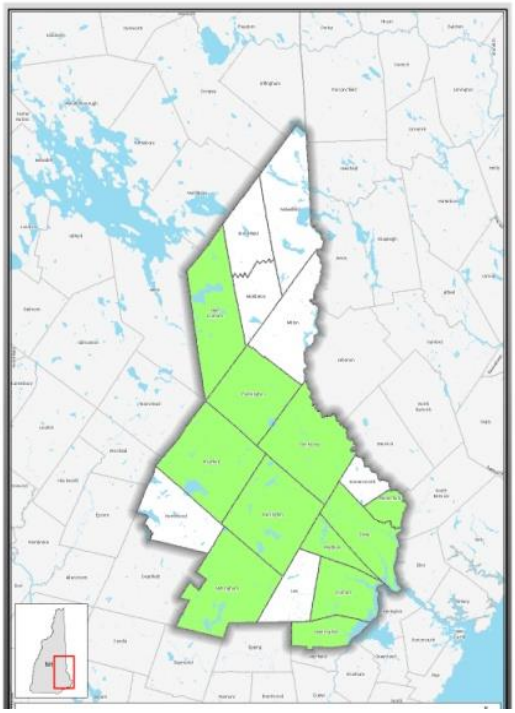


Figure 18 - Hemlock Wooly Adelgid occurrance in Strafford region communities
[Data Source: NHDRED]

The New Hampshire Invasive Species Committee is a volunteer group that discusses the ecological and economic impacts of invasive species found in New Hampshire. The Committee has developed two lists: Prohibited Invasive Species List & Restricted Species List. The Committee encourages research and educational outreach programs to inform the public about the major issues and how to manage these invasive species. Out of all the counties in New Hampshire, Strafford County has the most invasive species with a total of 338 species[35].

There are several ways to manage the presence of invasive species: mechanical, cultural, chemical, and biological[36]:
Mechanical: physically removing or creating a barrier around the invasive plant; most effective when biomass is low
Cultural: includes alterations of the plant community and switching to different soil
Chemical: using herbicides that target only invasive species to ensure that native species are not harmed
Biological: introduction of native species that will reduce the population of invasive species

The range of Hemlock Woolly Adelgid is expected to expand further as climate changes. For more information about the impact of climate change on invasive species, see the Climate Change Impacts and Adaptation Appendix.

Endangered Species [37]

One can argue about the importance of saving an individual species because of its uniqueness, cultural value, etc. But endangered species are important indicators of declining ecosystem health. The species described below live in important ecosystems or have specific habitat requirements. The health of these ecosystems (e.g. freshwater ponds and lakes) is directly tied to human health and wellbeing. If an individual species is lost because the ecosystem was too polluted or degraded to support it, this has implications for humans as well.

In New Hampshire, the American Brook Lamprey is only found within the Oyster River Watershed. Due to this species having a complex life cycle, meaning depending on two specific habitats, alterations or fragmentation of habitats has led to its reduced population. Although there currently are no specific regulations or protection efforts in place for this species, the encouragement of vegetated buffers along the river and maintaining stream crossings will help protect the brook lamprey. [Photo Credit: NHFG]

The Blanding's Turtle is restricted to wetland habitats in Southeastern New Hampshire. Blanding's Turtles are legally protected in the state, and any harassment, possession, or harm brought upon the animal is illegal. These turtles are extremely vulnerable to roadway fatalities. Therefore, the conservation of large undeveloped land is crucial to the survival of this species due to the species travel range to their nesting sites. [Photo Credit: NHFG]

Among the species that are currently experiencing decline from the loss of developing forestland is the New England Cottontail, the region's only native rabbit. Cottontail Rabbits are legally protected in the state, and any harassment, possession, or harm brought upon the animal is illegal. Conservation efforts for this species began in 2010, and included the creation of new shrubland habitat and supplemental feedings for the winter months, and the partnership between NHFG and the Roger Williams Zoo (RI) with the captive-breeding project. [Photo Credit: NHFG]

The Black Racer has a large home range which posed a great risk for the species as road mortality is one of its greatest threats. Therefore, it is imperative that patches of habitat remain unfragmented. Currently, there are no specific protection efforts for black racers in New Hampshire. [Photo Credit: NHFG]

Lakes, rivers and other land landlocked water bodies are threatened by anthropogenic activities. One of the most affected species is the Common Loon; these pressures reduce the reproductive success of the species. Statewide monitoring has been conducted by Loon Preservation Committee (LPC) since 1976. However, the extensive monitoring and management of this species in New Hampshire has also added to the reduced populations. Common Loons are legally protected in the state, and any harassment, possession, or harm brought upon the animal is illegal. [Photo Credit: National Geographic]

The Common Tern is a seabird which inhabits many of the coastal islands at the Isle of Shoals and random populations have been spotted in the Great Bay estuary including the Footman Islands in Durham (breeding season). This species is threatened by predator pressures and human disturbance to nesting sites. Erosion is also a major contributor to the reduced. Established in 1997, The Isles of Shoals Seabird Restoration Project seeks to protect the breeding grounds of terns on the islands by increasing human presence on the islands to prevent the presence of predators. [Photo Credit: Phylis Cooper/ FWS]

Table 10 - Endangered & Threatened Wildlife of NH65F

Endangered Species

Common Name	Scientific Name
American Brook Lamprey	*Lethenteron appendix*
Blanding's Turtle	*Emydoidea blandingii*
Brook Floater	*Alasmidonta varicosa*
Canada Lynx	*Lynx canadensis*
Cobblestone Tiger Beatle	*Cicindelo marginipennis*
Common Nighthawk	*Chordeiles minor*
Dwarf Wedge Mussel	*Alasmidonta heterodon*
Eastern Hognose Snake	*Heterodon platyhinos*
Frosted Elfin Butterfly	*Callophrys irus*
Golden Eagle	*Aquila chrysaetos*
Gray Wolf	*Canis lupis*
Karner Blue Butterfly	*Lycaeides melissa samuelis*
Least Tern	*Stena antillarum*
Marbled Salamander	*Ambystoma opacum*
New England Cottontail	*Sylvilagus transitionalis*
Northern Harrier	*Circus cyaneus*
Persius Dusky Wing Skipper	*Erynnis persius persius*
Piping Plover	*Charadrius melodus*
Puritan Tiger Beetle	*Cicindela puritana*
Ringed Bog Haunter Dragonfly	*Williamsonia lintneri*
Roseate Tern	*Sterna dougallii*
Sedge Wren	*Cistothorus platenis*
Shortnose Sturgeon	*Acipenser brevirostrum*
Small-footed Bat	*Myotis leibii*
Timber Rattlesnake	*Crotalus horridus*
Upland Sandpiper	*Bartramia longicaudo*
White Mountain Fritillary	*Boloria titania montinus*

Threatened Species

Common Name	Scientific Name
American Marten	*Martes Americana*
American Three-toed Woodpecker	*Picoides dorsalis*
Bald Eagle	*Haliaeetus leucocephalus*
Black Racer	*Coluber constrictor constrictor*
Bridle Shiner	*Notropis bifrenatus*
Common Loon	*Gavia immer*
Common Tern	*Sterna hirundo*
Grasshopper Sparrow	*Ammodramus savannarum*

Regional Wildlife Habitat Areas

In the Strafford region, a variety of wildlife habitats exist including wetlands, forests, grasslands, rivers, lakes, estuaries and many others. The preservation of these habitats is crucial to the region's ecosystem, because the loss of one species alone can disrupt the ecological integrity of the region.

[Photo credit: The Nature Conservancy; Lubberland Creek Preserve]

Established in 2011, The New Hampshire Wetland Program Plan's goal is to protect wetlands and the state's aquatic resources. New Hampshire's wetlands play a vital role in flood control, water filtration, and water storage/recharge for groundwater and surface waters. They also provide essential habitat to a variety of aquatic organisms. New Hampshire has had fewer reports of wetland loss than other coastal states; however, changes to the land still present a major threat for these vital habitats[38]. Approximately 28% of the Strafford region communities have designated "prime" wetlands and have adopted local regulations to protect these wetlands (PREPA 2013).

The New Hampshire Fish and Game Department released the Wildlife Action Plan (WAP) in 2006. The plan provides state decision makers with the tools to restore and preserve critical wildlife habitats for species which are considered threatened or endangered due to these habitat losses and other threats. New Hampshire currently has 26 species listed as endangered and 13 species listed as threatened. The Strafford region has 11 defined critical wildlife habitats.

Photo Credit: UNH Cooperative Extension

Appalachian Oak – Pine Forest: This habitat type is found mainly in southern New Hampshire and has a warm, dry climate with nutrient-poor, dry, sandy soils. This is the ideal habitat for whip-poor-wills, black bears, northern myotis, and the state endangered eastern hognose snake. Approximately 35% of the region is covered by this forest type. Unfortunately, this forest type is heavily threatened by development practices which have led to increased fragmentation.

Photo Credit: NH Fish & Game

Cliffs: These steep, rocky habitats are home to several species including the state endangered timber rattlesnake, state threatened peregrine falcon, bobcat, common raven, and long-tailed shrew. According to the Wildlife Action Plan 2010, within the Strafford region this habitat is only located in Pawtuckaway State Park, Nottingham.

Coastal Islands: These remote, isolated rocky shores provide critical habitats for seabirds as well as aquatic life. These habitats are threatened by recreation and climate change (sea level rise). Within the SRPC region there are a few coastal islands including the Footman Islands in Durham and Vols Island in Newmarket.

Photo Credit: Hike New Hampshire; Footman Islands

Photo Credit: UNH Cooperative Extension

Floodplain Forests: Also known as a riparian forest, this habitat type is susceptible to flooding and protects water quality through filtration and carbon sequestration. Important wildlife includes many bird species, several reptiles including the state endangered Blanding's turtle, amphibians, beavers, mink, and otters.

Grasslands: Grasslands are characterized as open areas of fields and wildflowers which will eventually convert back into forest if left unmaintained. Most commonly found in New Hampshire as agricultural fields, capped landfills, and wet meadows. Grasslands make up

approximately 5.9% of the region's land cover. Several state endangered species live here including the eastern hognose snake, northern harrier, and upland sandpipers as well as the state threatened grasshopper sparrow.

Photo Credit: UNH Cooperative Extension

Hemlock–Hardwood–Pine Forest: This forest type is the most common in the state. Approximately 66% of the region is covered by this forest type, providing habitat for several species including the cerulean warbler, eastern pipstrelle, northern goshawk, black bear, and bobcat. Many of these species require unfragmented habitat; however, development pressures still greatly threat this common habitat.

Lowland Spruce–Fir Forest: This forest type provides habitat for over 100 vertebrate species including spruce grouse, black bear, white-tailed deer, federally threatened and state endangered Canada lynx, state threatened American three-toes woodpecker, and state threatened American marten. Overharvesting is a major threat to this habitat.

Photo Credit: UNH Cooperative Extension

Northern Hardwood–Conifer Forest: This forest type is mainly concentrated in central and northern New Hampshire. Important wildlife includes the state threatened bald eagle, state threatened peregrine falcon, ruffed grouse, wood thrush, and northern long-eared bat. Forest harvesting has caused conversion of spruce-fir habitats into northern hardwood-conifer habitat.

Peatlands: Peatlands are very important habitats for carbon sequestration. When these habitats are removed the carbon is released into the atmosphere quicker which increases the negative impacts of greenhouse gasses. Non-point sources pollutants such as road salt, lawn fertilizers, and pesticides also threaten this habitat type. Many species live in this habitat including the state endangered Blanding's turtle, state endangered ringed boghaunter dragonfly, and state threatened spotted turtle.

Photo Credit: UNH Cooperative Extension

[Photo Credit: NH Division of Forests and Lands]

Rocky Ridges and Talus Slopes: Rocky ridges are found on outcrops and bedrock ridges. There are two types of rocky ridges – montane rocky ridge systems and Appalachian rocky ridge systems. Talus slopes are the result of cliff wasting which leads to loose or stable boulders and rocks at lower elevations. Wildlife includes the state endangered timber rattlesnake, state endangered eastern small-footed bat, state threatened peregrine falcon, and bobcat. To conserve these habitats, trail limitations should be established in the high risk areas.

Salt Marsh: Salt marshes are important coastal ecosystems where fresh and salt water mix creating estuaries. These estuaries are home to many organisms including salt marsh plants (halophytes), several bird species (American bittern, Nelson's sharp-tailed sparrow, salt marsh sharp-tailed sparrow, seaside sparrow, semipalmated sandpiper), many fish species, mammals, and invertebrates. These organisms have adapted to the tidal conditions which transport essential nutrients to and from the marsh. Unfortunately, approximately 30-50% of the state's saltmarsh habitat has been lost to development.

[Photo Credit: NH Division of Forests and Lands]

Table 11 - Conserved Wildlife Habitat

Municipality	Total Town Acres	Wildlife Habitat Acres Conserved	Percent Wildlife Habitat Conserved
Barrington	31,117.2	985.415	3.167%
Brookfield	14,880.3	1783.996	11.989%
Dover	18,592.1	1305.366	7.021%
Durham	15,852.2	3119.925	19.681%
Farmington	23,639.9	942.542	3.987%
Lee	12,927.2	1009.808	7.811%
Madbury	7,799.0	127.436	1.634%
Middleton	11,842.9	1961.620	16.564%
Milton	21,935.8	177.137	0.808%
New Durham	28,053.8	547.991	1.953%
Newmarket	9,080.3	1012.781	11.154%
Northwood	19,356.9	1127.550	5.825%
Nottingham	30,996.6	8040.069	25.939%
Rochester	29,080.6	138.690	0.477%
Rollinsford	4,842.8	267.071	5.515%
Somersworth	6,398.3	0.164	0.003%
Strafford	32,778.8	4672.875	14.256%
Wakefield	28,,717.1	11.254	0.039%
REGIONAL TOTAL	347,891.8	27231.69	7.83%

[Data Source: NH Wildlife Action Plan 2010: Wildlife Habitat Ranked by Ecological Condition, 2010; NH GRANIT Conservation and Protected Lands, 2012; GRANIT New Hampshire Political Boundaries, 2009]

Most wildlife habitat loss in the region is caused by development or the introduction of invasive species. The National Wildlife Federation (NWF) defines three major kinds of habitat loss:

Habitat destruction - A bulldozer pushing down trees is the iconic image of habitat destruction. Other ways that people are directly destroying habitat, include filling in wetlands, dredging rivers, mowing fields, and cutting down trees.

Habitat fragmentation - Much of the remaining terrestrial wildlife habitat in the U.S. has been cut up into fragments by roads and development. Aquatic species' habitat has been fragmented by dams and water diversions. These fragments of habitat may not be large or connected enough to support species that need a large territory in which to find mates and food. The loss and fragmentation of habitat make it difficult for migratory species to find places to rest and feed along their migration routes.

Habitat degradation - Pollution, invasive species and disruption of ecosystem processes (such as changing the intensity of fires in an ecosystem) are some of the ways habitats can become so degraded that they no longer support native wildlife.

As temperature and precipitation change, species may migrate outside of the boundaries of conservation land. This will likely have significant implications on species that depend on protected habitat as well as residents' access to high quality natural areas.

Regional & Local Grassroots Initiatives

New Hampshire Association of Conservation Commissions (NHACC) is a nonprofit organization which provides education and support for New Hampshire's local conservation commissions. Every community within the Strafford region has a Conservation Commission. The members on a Conservation Commission are responsible for the protection of the natural resources in their community. The NH Municipal Conservation Fund Guidebook was written to provide detailed information about major funding sources for municipalities to use for their conservation efforts.

New Hampshire Association of Conservation Districts (NHACD) provides statewide management, representation, and leadership for conservation districts to better protect and promote responsible use of the state's natural resources.

Collaboration and Support

- Discussing ideas, concepts, common challenges and goals
- Reach agreements on future decision-making
- Work with the State Conservation Commission in organizing community activities
- Assists communities with establishing guidelines

Founded in 1933, New Hampshire Wildlife Federation is a nonprofit organization which promotes conservation, environmental education, sportsmanship, and outdoor recreation. NHWF's mission is "to be the leading advocate for the promotion and protection of hunting, fishing and trapping as well as the conservation of, and access to, fish and wildlife habitat and resources." NHWF helps sponsor Project Wild, which is an international wildlife education program for teachers to participate in a six-hour workshop focused on conservation and environmental concepts.

Strafford Rivers Conservancy (SRC) seeks to protect the natural resources and aesthetics of lands in Strafford County. On December 21, 2012, SRC conserved a 98-acre private property in Farmington. Over 3,000 acres of land has been protected through conservation easements by SRC[39].

The Nature Conservancy (TNC) is the top conservation group working all around the world to protect environmentally important lands and waters. Over 119 million acres of lands and thousands of miles of rivers have been protected and over 100 marine conservation projects have been carried out[40]. TNC has collaborated with UNH and other organizations to rebuild degraded oyster beds in the Piscataqua Region Estuary. Since 2009, the program has restored over six acres of habitat and boosted the population by 1.2 million[41].

Table 12 - The Nature Conservancy (TNC) Projects – Strafford Region

Town(s)	Location	Total Acreage
Durham	Durham Point Sedge Meadow	20
Milton	Mt. Teneriffe Preserve	170
Newmarket	Lubberland Creek Preserve	400

Table 13 - Strafford Rivers Conservancy (SRC) Conservation Projects – Strafford Region

Town(s)	Conservation Project Name	Total Acreage	Year Acquired
Barrington	Borodavchuk	97.5	2007
Barrington	Coachman Estates	45	2006
Barrington	Forest Ridge	93	2006
Barrington	Goodwill	156	2007
Barrington	Newhall	80	2003
Barrington	Rivers Edge	41	2007
Barrington	Whitney	12.5	2000
Brookfield	Lavender	69.2	2008
Brookfield & Wakefield	MMRG/Lavender (Albee)	128.7	2008
Dover	Browne1	22.6	2005
Dover	Browne2	11.6	2004
Dover	Davis	10.9	2001
Dover	Dowaliby	5.4	2004
Dover	Enterprise Park	50	1995-2000
Dover	Estes	7.2	1994
Dover	Garland	5.9	1994
Dover	Huggins	77	2001
Dover	Hunt	59.3	2007
Dover	Myles/Ayer	34	1996, 2008
Dover	New Meadows	15	2006
Dover	Three Rivers Farm	17.7	1996, 2008
Dover	Towle	18.3	2003
Dover	Tuttle	116.5	2006-2007
Dover	Williams	17.4	2005
Dover & Rollinsford	Franklin	46.8	1989, 1993
Durham	Allen Farm	70.8	2002
Durham	Meadows	8	2001
Durham & Lee	Dunham/Cody	50.1	2003
Durham & Madbury	Gangwer (Roselawn Farm)	67.8	2008
Farmington	Fernald	47	2008
Farmington	French	61.3	2001
Farmington	LeClair	107.7	2009
Farmington	Smith (Flume)	7.1	2002
Lee	Flagg Hill Winery	114	2004
Lee	Lee Five Corners	20.7	2008
Lee	Schulz	53.8	2003
Lee	Short	10	2003
Lee & Durham	Ford	71.1	2008
Milton	Current	17	2005
Milton	Long	29.8	2000
Milton	Panish	103.2	2006-2007
Milton	Shortridge Farm	10.3	2002
New Durham	Holm	29	2008
Rochester	England Road	32.8	2007
Rochester	Gagne	87	1998
Rochester	Henderson	18.45	2005
Rochester	Towne	14.6	2007
Rochester	Vanderzanden	75	1999
Rollinsford	Aikman1	112	1999
Rollinsford	Aikman2	114.8	2005
Rollinsford	McCue	35	2003
Rollinsford	Ordway	45.4	1990
Wakefield	Goransson (Barbour)	115	2006
Wakefield	Remick	117	2007
Wakefield	Spencer Smith	26.9	2007

Bear-Paw Regional Greenways (BPRG) works towards conserving lands to protect the region's water, wildlife habitat, forests, and farmland in Allenstown, Candia, Deerfield, Epsom, Hooksett, Northwood, Nottingham, Raymond, and Strafford. Bear-Paw Regional Greenways has protected over 5,200 acres of land throughout Southeast New Hampshire. BPRG and the Boy Scouts of America Boston Minuteman Council are teaming up to conserve over 500 acres of wildlife habitat in Barnstead, Pittsfield, and Strafford. This land currently is part of the 700+ acre T.L. Storer Scout Camp; the camp will still be in operation if the conservation easement is accepted. According to the NHFG Wildlife Action Plan, 200+ acres of the land is ranked as highest by biological region.

Table 14 - Bear-Paw Regional Greenways (BPRG) Projects –Strafford Region

Town	Property Name	Acreage
Deerfield/Nottingham	Rosenfield/Mallette	85
Northwood	Coe-Brown Northwood Academy	52
Nottingham	Bock	16
Nottingham	Kimball (Owned by Bear-Paw)	22
Nottingham	Bacon	50
Nottingham	North River Forest (Bear-Paw)	52
Nottingham	Comte	132
Strafford	Anderson	31
Strafford	Pike	38
Strafford	Brownell	47
Strafford	Cahill Estate	55
Strafford	Cournoyer	55
Strafford	Bedford / Town of Strafford	79
Strafford	Auger	96
Strafford	Colwell	150
Strafford	Cooper/Walworth	158
Strafford	Isinglass River Conservation Reserve	286
Strafford	Strafford School District Property	290
Strafford	Evans Mountain Forest	970
Strafford/Northwood	Rooney	29
	Total	**1,541**

Since 1980, the Southeast Land Trust of New Hampshire (SELT) has sought out to conserve important lands and natural resources (water, forests, farmland, wildlife habitat, etc.) in southern New Hampshire through land reservations and conservation easements. SELT acquired Piscassic Greenway (316 acres) in April 2006 located in Newmarket and Newfields. The 89-acre Howard Swain Memorial Forest located in Deerfield and Nottingham was acquired by SELT in November 2011[42].

Table 15 - Southeast Land Trust of New Hampshire Projects – Strafford Region

Town	Property Name	Acreage
Durham	Amber Acres Farm	39
Lee	Flag Hill Winery	
Newmarket	Piscassic Greenway	330
Nottingham	Howard Swain Memorial Forest	89
Nottingham	Sullos Woodlands	175

Moose Mountains Regional Greenways (MMRG) recognizes & preserves important natural resource areas in Southern New Hampshire. MMRG services six communities: Brookfield, Farmington, Middleton, Milton, New Durham and Wakefield. Union Meadows, a 122-acre lot of land, in Wakefield has been conserved. Thirty-seven acres of fields and woods in Milton has been conserved. A 103-acre gravel pit has been conserved in Wakefield and Brookfield; the land has two wellheads that supply drinking water to the Wakefield and Brookfield communities[43]. Moose Mountains Regional Greenways hosts the annual Woods, Water and Wildlife Festival at Branch Hill Farm Festival in Milton[44].

Lakes Region Conservation Trust (LRCT) seeks to conserve scenic landscapes and wildlife habitats in the Lakes Region of NH. LRCT covers the Lakes Region of central New Hampshire (31 towns). A total of 22,624 acres (124 properties) has been conserved through LRCT. This includes 33 miles of shoreline, 19 mountain peaks, and more than 85 miles of hiking trails[45]. The 732-acre Copple Crown Conservation Area in Brookfield was acquired by LRCT in 1996[46].

The Great Bay Stewards focus on protecting and conserving the wildlife of the Great Bay Estuary through education and research. The Great Bay Discovery Center located in Greenland provides education and environmental awareness about the estuary to the public. Great Bay Stewards works with the Great Bay Estuarine Research Reserve and other organizations to reach their goal[47].

Implementation Strategies & Goals

Local Solutions is a vision and resource for the eighteen communities within the Strafford region. The findings of this plan reflect the 'advisory only' role of Regional Planning Commissions under RSA 36:45, which outlines the Purpose of Commissions and specifically the preparation of a "coordinated plan for the development of the region, taking into account the present and future needs with a view towards encouraging the most appropriate use of land". The RSA further defines the role of the comprehensive plan as that which promotes the "health, safety, morals, and general welfare of the region and its inhabitants" Regional Planning Commissions are also asked to "render assistance on local planning problems" and "make recommendations on the basis of…plans and studies to any planning board." This Plan represents not only a consultative resource for local-decision making, but also a foundation for the future work-planning of Strafford Regional Planning Commission and Strafford Metropolitan Planning Organization. Findings within each appendix shall shape the priorities and goals of this organization. The first step in this process is the identification of specific strategies, extracted from each appendix that fit within the goals created by the Strafford Regional Planning Commission, the Strafford Metropolitan Planning Organization, and Executive Director.

Strafford Regional Planning Commission staff, with the support of the Regional Master Plan Advisory Team, compiled a comprehensive list of high, medium, and low priority implementation strategies within the following implementation table. These strategies are designed to carry forward the findings and conclusions of this Master Plan and its appendices, as well as provide support functions and build capacity of our regional communities and stakeholders. Each strategy identified in the table below was extracted from a larger list of strategies within each appendix. Thus, these represent the most important (but not always those with the highest priority rating) implementation strategies from each plan appendix. It is important to note that for each strategy identified, Strafford Regional Planning Commission or Metropolitan Planning Organization is the acting or responsible body.

Below, please find the implementation table key. This key is intended to provide important information about each field within the table. Such information includes a list of possible values for the field, additional formatting elements, and a description of the field's contents.

Implementation Table Key

Priority Rating

Field Values: *High, Medium, Low*

Field Description: *Represents a qualitative ranking by SRPC staff based on the following weighted factors (weighted as ordered below):*

1. *Need - How great is the need for the strategy*
2. *Impact - How large of an impact with the strategy have on stakeholders*
3. *Feasibility- How feasible is the strategy from a budgetary and staffing perspective*
4. *Term - How long will the strategy take to complete and is the strategy a long, mid, or short term effort.*

Functional Areas

Field Values: *Land Use, Housing, Transportation, Economic, Water Infrastructure, Environment, Climate, Energy, Engagement*

Field Formatting:

- *Primary Functional Area Affected*
  - *Secondary Functional Area(s) Affected*

Field Description: *Strategies may bridge multiple planning areas. The Functional Areas field is an opportunity to identify those connections on both a primary and secondary level. Each strategy shall have only one primary functional area, but may have secondary functionality in multiple appendices.*

Strategy

Field Values: *(Open Response)*

Field Description: *Includes narrative of the action to be taken by SRPC/SMPO.*

Potential Partners

Field Values: *(Open Response) Listed by acronyms, please see Partner Acronym List on following page.*

Field Description: *Identifies a list of potential partners.*

Stakeholder Level

Field Values: *Local, Regional, State*

Field Formatting: **Bold** or *Italic*

Field Description: *Who will a strategy impact. Primary stakeholder level shall be in bold font, while secondary level(s) shall be italicized.*

Organizational Capacity

Field Values: *Support the Development of Statewide and Regional Data Systems, Align Data Collection, Performance Measures, and Outcomes with Policy Making, Incorporate Consistency into Plans and Processes, Modernize Planning and Development Tools, Improve Capacity to Use Decision Making and Planning Tools*

Field Description: *SRPC Organizational Goals were drafted by the Strafford Regional Planning Commission Executive Director with guidance from the Strafford Regional Planning Commission Executive Committee. These values represent long term organizational goals.*

Planning Function	Appendix	Priority Rating*	Strategy: SRPC will…	Stakeholder Level	Functional Areas*									Potential Partners
					Land Use*	Housing	Transportation	Economic	Water Infrastructure	Environment	Climate	Energy	Engagement	
Partners	EN	High	Support organizations and efforts which contribute to the environmental protection and conservation achievements making the state and region able to sustain its natural qualities and unique character	**Regional** *State* *Local*	○			○		●				NHDES, NHFG
Technical Assistance	EN	High	Support the promotion of local agriculture by continuing to advocate for local produce and the continued solvency of federal, state, and local funding programs	**Regional** *Local*	○			○		●			○	NHDA, NRCS, Seacoast Eat Local, Seacoast Growers Association
Education	EN	High	Educate communities about non-point source pollution in Great Bay & Regional public water bodies and advocate for local land use regulations which support practices which reduce pollution.	**Regional** *Local*					○	●			○	NHDES, PREP, Municipalities
Technical Assistance	EN	High	Support planning projects that protect floodplains, reconnect streams, protect wetlands, maintain natural flood storage & stormwater controls while maintaining wildlife habitat	**Regional**	○					●				NHDES, NHFG, PREP, UNH Stormwater Center

Planning Function	Appendix	Priority Rating*	Strategy: SRPC will…	Stakeholder Level	Functional Areas*									Potential Partners
					Land Use*	Housing	Transportation	Economic	Water	Environment	Climate	Energy	Engagement	
Outreach	EN	High	Advocate for incorporation of permanent land preservation within project planning processes to foster compact, well organized urban areas while safeguarding wildlife habitat, farmland, watershed area & open spaces in perpetuity	**Regional** *Local*	○					●				NHACC, NHACD, SPNHF, SRC, TNC, BRRG, SELT, MMRG, LRCT, Great Bay Stewards, NHFG
Partners	EN	High	Support the cooperative nature of local, regional & state partners to achieve desired outcomes based on community culture, natural & economic assets, and common values	**Regional** *Local*				○		●				NHDES, PREP
Outreach	EN	High	Recognize that highly functional watershed ecosystems are essential to sustain ecosystem services we depend on and advocate for higher priority for funding associated with natural watershed infrastructure	**Regional**	○					●				NHDES, PREP

Planning Function	Appendix	Priority Rating*	Strategy: SRPC will…	Stakeholder Level	Functional Areas*									Potential Partners
					Land Use*	Housing	Transportation	Economic	Water	Environment	Climate	Energy	Engagement	
Outreach	EN	High	Advocate for integrated strategies that employ current management practices designed to sustainably protect, simulate or restore natural watershed features to benefit all watershed impacts	**Regional**	○			○		●				NHDES, PREP
Technical Assistance	EN	High	Continue providing technical assistance to the public, agencies, land trusts, towns & landowners to continue support for wildlife habitat resource areas & encourage people to utilize tools to protect them	**Regional** *Local*	○					●			○	SPNHF, SRC, TNC, BRRG, SELT, MMRG, LRCT, Great Bay Stewards, NHFG
Outreach	EN	Medium	Encourage SRPC member communities to incorporate regulative measures designed to protect and preserve irreplaceable historic sites unique to the region for future generations to enjoy	**Regional** *Local*	○					●			○	NH Dept. of Cultural Resources, Municipalities

Planning Function	Appendix	Priority Rating*	Strategy: SRPC will…	Stakeholder Level	Functional Areas*									Potential Partners
					Land Use*	Housing	Transportation	Economic	Water	Environment	Climate	Energy	Engagement	
Partners	EN	Medium	Continue to support the organizations and programs which contribute to the conservation of open space and the unique scenic beauty of our region	**Regional**	○					●				Local Conservation Commissions, Regional Land Trusts
Education	EN	Medium	Advocate for effective planning, design, management & programming of public spaces to strengthen the connection between people and the community in which they reside through cultural, economic, social activities connected to nature	**Regional** *Local*				○		●			○	Municipalities
Technical Assistance	EN	Medium	Encourage communities to establish a Brownfields Redevelopment Program through the NH Brownfields Program and the EPA in order to encourage the redevelopment and/or reuse of contaminated properties	**Regional** *Local*	○				○	●			○	EPA, NHDES, Municipalities

Planning Function	Appendix	Priority Rating*	Strategy: SRPC will…	Stakeholder Level	Functional Areas*									Potential Partners
					Land Use*	Housing	Transportation	Economic	Water	Environment	Climate	Energy	Engagement	
Outreach	EN	Medium	Advocate for Smart Growth approaches & supporting programs that fit local, regional & statewide needs, provide economic benefits, cultural & natural resource preservation & protection, and which preserve agricultural-based economies and add value to our communities	**Regional** *State* *Local*				○		●				NH Dept. of Cultural Resources, Municipalities
Education	EN	Medium	Encourage communities to perform regular testing of private wells for contaminants such as radon, arsenic, MTBE, etc.	**Local**					○	●			○	NHDES, VLAP, VRAP, Municipalities
Technical Assistance	EN	Medium	Address inefficiency of current system to ensure long-term sustainable management of water resources & services and broaden the range of interest groups that will support the actions which support sustainability	**Regional**				○		●				NHDES, PREP, VLAP, VRAP
Education	EN	Medium	Advocate for BMPs (e.g. LID) that improve water quality	**Regional** *Local*	○				○	●				NHDES

Planning Function	Appendix	Priority Rating*	Strategy: SRPC will…	Stakeholder Level	Functional Areas*									Potential Partners
					Land Use*	Housing	Transportation	Economic	Water	Environment	Climate	Energy	Engagement	
Outreach	EN	Low	Encourage the establishment and continued maintenance of recreational trail networks within the region and the supporting funding mechanisms	**Regional** *State* *Local*	○					●			○	NH Parks & Recreation
Technical Assistance	EN	Low	Coordinate public utilities inventory work	*Local*						●			○	NHDES

References Cited

[1] U.S. EPA Website: National Environmental Policy Act – Basic information http://www.epa.gov/compliance/basics/nepa.html
[2] Paul Rogers (EPA Journal, January/February 1990)
U.S. EPA Website – EPA history: The Clean Air Act of 1970
http://www2.epa.gov/aboutepa/epa-history-clean-air-act-1970
[3] U.S. EPA Website – Summary of the Clean Water Act
http://www2.epa.gov/laws-regulations/summary-clean-water-act
[4] U.S. EPA Website – Agriculture and the Clean Water Act
http://www.epa.gov/agriculture/lcwa.html
[5] NH DES –About the Department
http://des.nh.gov/aboutus/index.htm
[6] New Hampshire General Court, Revised Statutes Online
TITLE L – Water Management and Protection
Chapter 485-A: Water Pollution and Waste Disposal
http://www.gencourt.state.nh.us/rsa/html/l/485-a/485-a-mrg.htm
[7] U.S. Department of Agriculture
National Agricultural Statistics Service - Crop Production, March 8, 2013.
[8] National Corn Growers Association
Information sheet: "World of Corn. Unlimited Possibilities" 2013
http://www.ncga.com/upload/files/documents/pdf/WOC%202013.pdf
[9] AFT website: http://www.farmland.org/programs/states/nh/default.asp
[10] United States Dept. of Agriculture – 2012 Census of Agriculture
Summary by Size of Farm
http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/New_Hampshire/st33_1_064_064.pdf
[11] United States Dept. of Agriculture – *2012* "Census of Agriculture", May 2014
http://www.agcensus.usda.gov/Partners/Infographics/Farmers_Marketing_Hi.jpg
[12] United States Department of Agriculture – Natural resources Conservation Service
"Definition of Farmland Soils": http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ak/soils/surveys/?cid=nrcs142p2_035988
[13] National Crop Insurance Services (June, 2014), "Agriculture is Vital to New Hampshire's Economy"
http://www.cropinsuranceinamerica.org/wp-content/uploads/newhampshire1.pdf
[14] New Hampshire Department of Resources and Economic Development –Division of Forests and Lands (2010)
"Important Data and Information about New Hampshire's Forests"
http://www.nhdfl.org/library/pdf/Planning/NH%20Statewide%20Assessment%202010%20update.pdf
[15] American Forest Foundation website: https://www.forestfoundation.org/
[16] American Tree Farm System website: https://www.treefarmsystem.org/
[17] NH Tree Farm Program website: http://www.nhtreefarm.org/
[18] Division of Forests and Lands website: Timber Harvesting information
Info sheet written by University of New Hampshire Cooperative Extension: "Selecting a Forester"
http://www.nhdfl.org/library/pdf/Forest%20Protection/Selecting%20a%20Forester.pdf
[19] North East State Forester Association: The Economic Importance of New Hampshire's Forest-Based Economy 2013
[20] PSNH Wood-Fired Power Plant website: http://www.psnh.com/RenewableEnergy/About-PSNH/Wood-Fired-Power-Plants.aspx
[21] NH Department of Resources and Economic Development - Division of Forests and Lands, in cooperation with the New Hampshire Forest Advisory Board (2010): "New Hampshire Forest Resource Strategies"
http://www.nhdfl.org/library/pdf/Planning/NH%20Forest%20Resource%20Strategies%20Final.pdf
[22] Society for the Protection of New Hampshire Forests: List of Forest Society Permanent Reservations (updated 11/20/14)
Website: http://www.forestsociety.org/pdf/reservations.pdf
[23]New Hampshire State Parks and Recreation "(2013-2018) Statewide Comprehensive Outdoor Recreation Plan – Chapter 1: Trend Impacting Outdoor Recreation" http://www.nhstateparks.org/uploads/pdf/NH-SCORP_2013-2018_Chapter-1.pdf
[24] New Hampshire Department of Environmental Services – Exotic Species Program
Exotic Species Program Report 2006-2008 - http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wd-09-08.pdf
Exotic Species Program Website: http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/

[25] Union Leader Article: http://www.unionleader.com/article/20140121/NEWS01/140129909&source=RSS
[26] New Hampshire Department Environmental Services - Official List of Public Waters: http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/olpw.pdf
[27] NHDES Designated Rivers: http://des.nh.gov/organization/divisions/water/wmb/rivers/desigriv.htm
[28] 2013 Strafford Regional Planning Commission Handbook: http://strafford.org/cmsAdmin/uploads/ec_docs/draft_2013.pdf
[29] The City of Dover and the University of New Hampshire Stormwater Center (2012) - Final report to NH Department of Environmental Services: "Berry Brook Watershed Management Plan – Implementation Phase I" http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/20120118_Final_Report2.pdf
[30] Roseen et al. (2011) UNH Stormwater Center: "Restoring Water Quality in the Willow Brook Watershed Through LID Retrofits. http://www.unh.edu/unhsc/recent-projects/restoring-water-quality-willow-brook-watershed-through-lid-retrofits
[31] New Hampshire Department of Environmental Services Fact Sheet (2009) "Best Management Practices for Groundwater Protection": http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-22-4.pdf
[32] Foster's Daily Democrat Article: Cocheco River Watershed Coalition is dissolved (April 2, 2014)
[33] American Chestnut Foundation – History http://www.acf.org/history.php
[34] EEDMaps website: http://www.eddmaps.org/tools/statereport.cfm?id=us_nh
[35] NH Department of Agriculture, Markets & Food-Invasive Species FAQ: http://www.agriculture.nh.gov/divisions/plant-industry/faq-invasive-species.htm#committee
[36] NH Guide to Upland Invasive Species PDF: http://extension.unh.edu/resources/files/Resource000988_Rep1134.pdf
[37] http://www.wildlife.state.nh.us/Wildlife/Nongame/endangered_list.htm
[38] NHDES: New Hampshire Wetland Program Plan PDF
[39] Strafford Rivers Conservancy website: http://straffordriversconservancy.org/
[40] The Nature Conservancy website: http://www.nature.org/
[41] TNC Oyster Restoration Program: http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newhampshire/oyster-restoration/index.htm
[42] Southeast Land Trust of New Hampshire website: http://www.seltnh.org/
[43] Moose Mountains Regional Greenways website: http://www.mmrg.info/index.html
[44] MMRG festival info: http://www.mmrg.info/festival/
[45] Lakes Region Conservation Trust website: http://lrct.org/lrct-conserved-properties/642-2/
[46] Moose Mountains Regional Greenways website: http://www.mmrg.info/PR_13_MMRG_CoppleCrown.html
[47] Great Bay Stewards website: http://www.greatbaystewards.org/