#### CHAPTER VII NATURAL RESOURCES

#### **INTRODUCTION**

Salisbury's predominantly rural 25,344 acres are blessed with an abundance of natural resources: undeveloped fields and many large, unbroken tracts of forestland that support numerous species of wildlife and native plants, a Class A river with largely undeveloped shorelands, thousands of acres of undisturbed wetlands, several ponds, a mountain, and six hills – features that residents identify as important and a key reason for choosing to live here.

Currently, there are 4,720 acres of land under conservation easements and approximately 17,323 acres of land in current use.

The Natural Resource section of the previous 1991 Master Plan addressed basic data about the town's resources. It included information about water features, topography, agriculture, soils and restrictive development constraints associated with the presence of certain natural resources. Some of the key natural resource goals of that Master Plan were to preserve the wildlife in the town, to protect watershed areas from development-associated pollution and to acquire ecologically important parcels of land.

Conservation of the natural resources and rural heritage of Salisbury are important goals of this Master Plan and **NATURAL RESOURCES CHAPTER**. The **NATURAL RESOURCES CHAPTER** of the 2007 Master Plan includes data for various types of water, geologic resources, land resources, and ecological resources. A set of maps depicting the natural feature findings in Salisbury is included.

The Plan formulates a list of Objectives and Recommendations to guide the Town toward maintaining the environmental and human health benefits that derive from the "rural character" most residents desire.

#### **OBJECTIVES OF THE CHAPTER AND RECOMMENDATIONS**

- To protect valuable natural resources and the essential ecosystem services\* they provide. Natural resources include water, agricultural/horticultural, forest, wildlife, and geologic resources.
  Ecosystem services include air and water purification, aquifer recharge, flood protection, carbon sequestration, wildlife habitat, organic waste and nutrient recycling, noise abatement, pollination of native plants and agricultural/horticultural crops, space for recreation, as well as useful products such as food and forage crops, lumber, biomass and fuelwood and the jobs they support.
  - Undertake a comprehensive natural resources inventory, using the skills and resources of the Conservation Commission, interested residents, outside consultants, and high school/college students.
  - Use the results of the wetlands assessment to designate "prime wetland" systems and other important natural resources sites within the Town.
  - Consider establishing watershed protection overlay zones to maintain water quality.
  - Update current zoning regulations to prohibit future "high-risk" commercial activities, such as vehicle service and repair shops, junkyards, and other activities that produce liquid waste near surface waters.
  - Propose a Town ordinance to restrict large, commercial groundwater withdrawals from within the Town.
  - Increase the percentage of the Current Use Change Tax directed to the Conservation Fund.
  - Develop and maintain a list of Tree Farms/managed forests, reviewing current use forms and forest management plans as a starting point.
  - Educate residents about various federal and state cost-sharing programs that provide financial support and technical assistance to landowners interested in improving wildlife habitat or implementing environmental practices. Current cost-sharing programs include:

**EQIP** (Environmental Quality Incentives Program): EQIP helps install structural and management practices on eligible agricultural and forest land.. The cost sharing rate is 50 percent

**WHIP** (Wildlife Habitat Incentives Program): WHIP provides up to 75 percent cost share to establish and improve fish and wildlife habitat.

#### NH Fish and Game Department Small Grants Program: This state

program helps restore, sustain, or enhance wildlife habitat on privately owned land. Owners of private, municipal, corporate or other nongovernmental lands can apply for funds to implement habitatimproving practices. These grants can be used as a match for WHIP and other programs.

- Educate citizens about the community value of "working landscapes," lands that simultaneously conserve natural resources and produce current or future income for their owners.
- Conduct an annual community-wide roadside clean-up.
- Establish a volunteer program to seed and mulch open and exposed soils within the town's rights-of-way along roads to prevent erosion and invasive species.
- Educate residents about safe and effective alternatives to toxic household products.
- Establish annual household hazardous waste collection days at the Town transfer station or a regional collection site to keep such wastes out of the Town's municipal waste stream.
- Educate citizens and encourage environmentally friendly landscaping practices, including use of native plant materials on new and existing sites.
- To preserve quality of life and the rural character of the Town by conserving open space, protecting important natural resources, and preserving scenic vistas. Protections would include limiting or mitigating lights and noise.
  - Educate town officials and the general public about the value of water resources, wildlife habitat, agricultural/horticultural land and open space in general.
  - Provide recommendations about natural resources to the Planning Board for consideration during subdivision and site plan review.
  - Ensure that town ordinances don't inadvertently or unduly restrict commercial farming and horticulture, forestry, and other resourcebased enterprises that help preserve ecosystem services that benefit all residents.
  - Develop ordinances that promote cluster development by special exception in appropriate zoning districts to facilitate the management and protection of water resources as permanent open space.
  - Educate landowners on the merits of sustainable, "working" forests. Include information about best management practices, current use, and conservation easements.

- Continue to educate landowners about the benefits of well-crafted conservation easements.
- Educate current landowners and prospective developers about the benefits of landscaping with native plants, as well as the harmful effects of invasive/exotic plant species.
- Consider light and noise pollution during review of site plans and subdivisions.
- Educate landowners about backyard burning laws to avoid burning toxic materials.
- Include provisions for the retention of rural character in the Subdivision Regulations.
- Promote collaboration between the Conservation Commission and other town boards/organizations (e.g., the Salisbury Historical Society), to identify important natural resources that may have both historical and ecological value.
- To educate Town officials and the citizens of Salisbury about natural resources.
  - Establish criteria for identifying and selecting potential conservation lands for acquisition.
  - Acquire important land or easements on important land within the Town through the Land Conservation Investment program (LCIP) or similar programs.
  - Educate landowners on the merits of sustainably managed forests and other "working landscapes."
  - Raise awareness of invasive/exotic plant species and measures citizens can take to prevent their spread.
  - Establish a volunteer program to seed and mulch open and exposed soils within the town's rights-of-way along roads to prevent soil erosion and encroachment of invasive species.
  - Conduct an annual roadside clean-up program.
  - Hold educational workshops on topics involving Salisbury's natural resources. Topics could include, among many others, wildlife habitats, native plants, forest management, invasive/exotic species, and ecological landscaping.
- To preserve the valuable wildlife habitat currently abundant in the Town.

- Inventory the wildlife habitats in the Town.
- Examine ways the Town can conserve sensitive areas in which significant animal and plant species exist, such as wetlands, ponds, etc.
- Apply for grants to help fund acquisitions of land and conservation easements.
- To preserve and enhance natural recreational resources.
  - Obtain public access to the Blackwater River and other waterbodies.
  - Coordinate a meeting of the owners of conservation easements to develop a plan for public use of these lands.
  - Promote knowledge of trails and encourage responsible use of the Class VI road hiking trails in Town.
  - Host an ongoing series of talks and nature walks for children and adults that raise public awareness of the community value of natural resources and their protection.

#### COMMUNITY SURVEY RESULTS

In 2005, the Planning Board distributed community surveys to 411 Salisbury households. Of the 411 surveys distributed, 102 were returned, indicating a total response rate of 25 percent. The results of the survey can be found in the **APPENDIX CHAPTER**. Answers to the questions pertaining to natural resources issues are summarized below.

The survey asked residents if they support the acquisition of land for conservation purposes. Respondents overwhelmingly believe that land should be acquired by the Town and conserved. Of the residents responding, over 73 percent responded yes (Table VII-1). Additionally, nearly 50 percent of respondents support allocating the land use change tax to the Conservation Commission for land purchases and conservation (Table VII-2). The responses to these questions indicate that Salisbury residents do find conservation and open spaces issues important.

# Table VII-1Do you support the acquisition of lands for conservation purposes?

Response	Number of Respondents	Percent
Yes	75	73.53%
No	14	13.73%
No Opinion	13	12.75%
-		
Total	102	

#### Table VII-2

# Would you support the land use change tax to be allocated to the Conservation Commission for land purchases?

Response	Number of Respondents	Percent
Yes	46	48.42%
No	21	22.11%
No Opinion	28	29.47%
Total	95	

Further, more than 80 percent of respondents stated that preservation of open space in Salisbury is very important (Table VII-3).

### Table VII-3 Please indicate how important the preservation of open space in Salisbury is to you:

Response	Number of Respondents	Percent
Very important	82	81.19%
Not important	9	8.91%
No Opinion	10	9.90%
-		
Total	101	

Residents were asked to indicate which of Salisbury's natural resources were of the most importance. Rivers and streams were ranked as most important with a score of 256 (Table VII-4). Other important features include fields and agriculture, forests and open space. Many of the features were closely ranked.

### Table VII-4

Feature	Total Score
Rivers/Streams	256
No Opinion	252
Fields/ Agriculture	250
Forest	248
Open Space	243
Fish/Wildlife management	241
Scenic views	229
Ponds	229
Wetlands	228

#### Please rank Salisbury's features below of importance to you from 1-3. Number 1 is *not* important, Number 2 is *somewhat* important and Number 3 is *most* important.

### INVENTORY OF NATURAL RESOURCES

A mapped inventory of many of Salisbury's natural features was performed as part of this Master Plan Chapter in order to allow the Planning Board to identify and manage the town's varied natural resources. A majority of the resource information came from the 1998 Central New Hampshire Regional Planning Commission *Natural, Cultural and Historical Resources Inventory*. Additional information was also gathered.

### Water Resources

The *Water Resources Map* shows hydrographic features, including aquifers, wetlands, watershed boundaries, public water supplies and well locations.

# Water Supplies

The Town of Salisbury has no public water or sewer system. All Salisbury residents are served by private wells drawing water from the bedrock, overburden glacial till, and stratified drift aquifer. The N.H. Department of Environmental Services has tracked the locations and number of well permits issued since 1984. Since that time, the greatest number of wells has been situated along Route 127 (26), Route 4 (23) and Hensmith Road (23) (Table VII-5). A total of 234 new or replacement wells were installed in Town between 1984 and 2006.

# Table VII-5

Road Name	Number of Wells	
Gerrish Road	8	
Hensmith Road	23	
New Road	17	
North Road	12	
Raccoon Hill Road	12	
Route 127	26	
Route 4	23	
South Road	11	
West Salisbury Road	11	
Whittemore Road	7	
Source: NU DES One Ston Data		

#### New Residential Well Installation 1984-2005 By Road Occurrence (>5 wells)

Source: NH DES One Stop Data

### Ponds

The several ponds located in Salisbury are valued not only for aesthetic reasons, but also for the diversity of wildlife habitat that they provide. These ponds include Tucker Pond, Stirrup Iron Pond, Wilder Pond, Greenough Pond and Marsh, Duck Pond and Shaw Mill Pond.

The largest pond in Salisbury, Tucker Pond, covers 56.6 acres. It is listed on the N.H. Official List of Public Waters and therefore comes under the protection of the Comprehensive Shoreland Protection Act (CSPA). Tucker Pond serves as a tributary to Knight Brook, which flows into Boscawen.

### Rivers

The Blackwater River runs through Salisbury. In Salisbury, it is a 5<sup>th</sup> order stream and comes under the protection of the CSPA. In the northern part of Salisbury, the Blackwater is naturally impounded and forms "the Bay" -ariverine system consisting of approximately 75 acres of open, slow-moving water and associated wetlands. South of the Bay, the Blackwater meanders through the western part of town and crosses the Webster town line. In the southwest part of town, the Blackwater River forms part of the US Army Corps of Engineers (ACOE) Blackwater Dam and Reservoir system. In the ACOE area, the land surrounding the river is federally owned and used for flood control purposes. As such, it cannot be developed and serves as a large unfragmented tract of conservation land. The large size of the flood-control land and its proximity to other large tracts of undeveloped land make this area an important water resource with significant wildlife habitat value.

Brooks

Salisbury is located within two watersheds – those of the Blackwater and Merrimack Rivers. Streams in the eastern side of town, such as Punch Brook and Stirrup Iron Brook, generally flow southeastward to the Merrimack River. Streams in the western part of town generally flow south to the Blackwater River. Many of Salisbury's brooks were the former sites of mills, and remnants of stone dams and retaining walls remain in some areas.

#### Hydric Soils

Due to Salisbury's high position in the watershed, the complicated pattern of hills and valleys, and the relatively thin glacial soils overlying nearly impermeable glacial till, a relatively large area of Salisbury has poor drainage. Hydric soils of the Whitman, Greenwood, Ossipee, Moosilauke, Chocorua Walpole, Pillsbury and Ridgebury Series, comprise approximately 15 percent of the soils in Salisbury

#### Aquifers

An Aquifer is an underground geological formation composed of sand, soil, gravel, or porous rock through which groundwater moves and is capable of supplying significant quantities of groundwater to wells and springs. These aquifers are often an important source of water for public water supply, agriculture and industry. The demand for groundwater from the bedrock aquifer is continuously increasing as new sources of surface water decrease and the cost of surface-water treatment increases. Aquifers can occur at various depths.

There are three major types of aquifers:

- Stratified drifts are aquifers made up of sand and gravel materials. This aquifer is a prime source of water for municipalities or other large-volume users.
- Till aquifers are a mixture of clay, silt and gravel materials that yield small volumes of water which may be adequate for small scale users such as private residential use.
- Bedrock aquifers are wells drilled into bedrock. When a well is drilled into these rocks, the bore hole intercepts numerous fractures, allowing water to seep into the well. If a well hits an extensive fracture system, the water yields may be high. On the average, these aquifers yield smaller volumes of groundwater than wells located within stratified drift.

The principal aquifer in Salisbury, a stratified drift aquifer of moderate to high transmissivity, lies along the course of the Blackwater River from the edge of Andover near Route 4 and extends through Salisbury and on into the town of Webster. This provides the Town with a valuable resource that should be protected for future use. The *Water Resources Map* shows the major aquifers in Salisbury.

#### Wetlands

Salisbury has a considerable acreage of high-value wetlands. The same factors that produce the town's hydric soils contribute to the formation of wetland ecosystems. In addition, the presence of an active beaver population creates the conditions for continually evolving wetlands.

Wetlands perform many critical ecosystem services that help sustain our life support systems. Wetlands can:

- Buffer against floods by slowing and storing floodwaters
- Clean water moving through by removing sediment and contaminants
- Recharge groundwater
- Provide critical spawning grounds for amphibians and fish
- Provide wildlife habitat
- Provide aesthetic, recreational and educational opportunities

The Salisbury Conservation Commission has begun and plans to complete an extensive natural resources inventory (NRI). As part of this NRI, the Commission will identify the town's wetlands on maps according to their type and size. This will provide a valuable reference for future planning and conservation decisions.

The largest contiguous area of wetlands occurs along the Blackwater River. These largely riverine wetlands are predominantly floodplain-forested (broad-leaved deciduous) and scrub-shrub (broad-leaved deciduous) wetlands. South of Scribners Corner, there are emergent wetlands (marshes) associated with the Blackwater. As part of the Blackwater riverine system, these wetlands play a critical role in attenuating floodwaters, removing sediment and contaminants, nutrient cycling, providing wildlife habitat, and providing opportunities for education and recreation.

Other sizable wetlands include:

- Greenough Pond
- Wetlands along Bog Road
- Wetlands associated with Shaws Mills Pond and Strirrup Iron Brook
- Wetlands associated with Punch Brook
- Wetlands running the northern end of Rte 4 near the Andover town line
- Wetlands along New Road
- A peatland on Hensmith Rd. More info, including photos.

All of these wetlands perform important ecological functions.

# Vernal pools

Salisbury contains many vernal pools, which are small, isolated wetlands found in depressions in the landscape. Although varying in shape size and location, all vernal pools fill with water in the spring from snow melt, groundwater, and precipitation. They are usually separate from other wetlands, although many pools are located in floodplains and other low-lying areas adjacent to rivers and other waterbodies. The duration of a pool's flood cycle depends on its size, depth, water source, and condition of surrounding upland, but most pools dry out by late summer.

Because most pools are isolated and temporarily flooded, they do not support fish, which prey on the eggs and larvae of many amphibians and invertebrates. Wood frogs and "mole" salamanders, which include spotted, blue-spotted, Jefferson's, and marbled salamanders, require vernal pools for breeding habitat. Others species such as spring peepers, tree frogs, American toads, green frogs, and Eastern newts, will also lay their eggs in vernal pools, but these species do not require them. Certain invertebrates, such as fairy shrimp and fingernail clams, also require these temporary wetlands for breeding and egg-laying. Vernal pools are especially important habitats for Blanding's and spotted turtles, which rely on them for protein-rich food in early spring, and take refuge in them during overland travels among adjacent wetlands and waterbodies.

Because vernal pool amphibians live in the uplands surrounding the pool, conservation of these species requires that a relatively undisturbed forested habitat be maintained around each pool. In addition, because amphibians and turtles travel extensively among wetlands, it is essential to provide travel corridors among pools and wetlands in a given area.

# **Potential Threats to Water Resources**

The need to identify and mitigate potential threats to these water resources is very important. The Blackwater River provides part of the public water supply for the City of Concord. This primarily undeveloped river offers a wide variety of recreational opportunities: fishing, canoeing, kayaking, and swimming. The Blackwater provides outstanding habitat for many native wildlife species, and supports diverse plant communities.

Threats to water supplies arise from many different potential contaminant sources. Each pollutant threat may affect water at a different stage of its movement from water vapor in the atmosphere to liquid groundwater. Simply put, water is not static or stays in a single place; it collects in the atmosphere and may be released to the ground as rain or fog after which it is either absorbed into the ground, collected by plants or begins to move across the ground surface until it is collected into a water body.

Ultimately, water flowing across the surface becomes absorbed into underground aquifers or flows into rivers, streams and ponds where, if not impounded for a local purpose, will continue downstream, eventually winding up in the ocean. Rainwater which reaches underground aquifer catchment areas may be pumped to the surface by public or private wells for use as a public water supply resource. Surface water may also be converted back to water vapor either by evaporation or released from plants through transpiration. In this way, through these "evapotranspiration" processes, ground water returns to the atmosphere.

Water in the atmosphere or collected on the earth's surface has many opportunities to pick up pollutants which could dramatically affect its quality. Mercury and other air-borne pollutants emitted into the atmosphere by coal-fired power plants may affect water vapor collected in clouds and be widely scattered; fertilizer runoff from agricultural fields and shoreline landscapes can run into nearby streams; fecal material released from nonfunctional septic systems and gasoline or other chemicals spilled from commercial and industrial sites can leach into aquifer recharge and filtration areas and eventually reach and contaminate ground water.

Thus, there is an essential need to identify, analyze, monitor and appropriately control potential point and non-point water pollution sources throughout the Town of Salisbury. Part of this identification and control process is currently being carried out by the New Hampshire Department of Environmental Services (NHDES) who are presently responsible for monitoring all public water supplies. There are, however, no regulations which scrutinize private water wells or the quality private well water. Thus, this chapter was developed in part to provide guidance so that the Town may have an accurate record of where local water resources are located, how these resources may be threatened, and what actions and programs should be put into place which will remove or mitigate the perceived sources of pollution.

### Point-Source Pollution

The Town of Salisbury has no municipal water supply or delivery system. Thus, all potable water comes from on-site bedrock or overburden (dug) wells. There is also no municipal sewer system so all homes and businesses must be serviced by on-site sanitary disposal systems. The most common method of heating structures in the Town is via heating systems fueled by No.2 heating oil, which is stored on site in either Aboveground Storage Tanks (AST's) or Underground Storage Tanks (UST's). Based on the above information it becomes apparent that all homes and businesses in the Town use and rely on water resources. Proper management of businesses that use or generate waste products other than normal septic waste such as petroleum related compounds, gasoline, paint, dyes, bleaches, as well as other hazardous waste components must be monitored and carefully regulated to protect the underlying water resources. Point sources of groundwater and surface water pollution vary greatly. Contamination can result from specific point sources such as AST's, UST's, floor drains, dry wells, direct ground deposition, burying wastes, and septic systems.

One way to deal with potential point sources of contamination is via monitoring of surface and/or groundwater for potential impacts. The State of New Hampshire Department of Environmental Services (NHDES) requires an Underground Injection Control (UIC) permit for anyone discharging anything other than normal household waste to an on-site sanitary disposal system. The NHDES also regulates floor drains. Floor drains in areas where regulated contaminants are stored must discharge to a tight tank. Floor drains in such sensitive areas are not allowed to discharge to the on-site septic system, dry well, or ground surface. Non-residential AST's and UST's may also be regulated, depending on the size, contents, and use of the tanks.

The use of the existing regulatory base and expansion on this base to fit the community needs is a cost-effective way to deal with some point sources of pollution.

Locations potentially hazardous to groundwater include junkyards, auto-body shops, above-ground storage tanks, and gravel pits.

### Non-Point-Source Pollution

Another threat to Salisbury's waterways is non-point source (NPS) pollution, also known as polluted runoff. Non-point source pollution (NPS) is pollution that cannot be traced back to any specific source; it is the accumulated pollution resulting from everyday activities. Its effects are magnified by impervious surfaces, such as building roofs and paved surfaces. Water cannot infiltrate these surfaces, causing more water to run off over the land. As water washes over the land, it picks up oil, pesticides, fertilizers, sediment, and other pollutants that have been placed into the environment by everyday activities. The runoff water flows into storm drains or directly into water bodies, carrying the pollutants that have been deposited. As little as a 10 percent impervious surface on a lot can begin to negatively affect a waterway. Thus, the more intensively used a piece of land is, the more nearby waterways are negatively affected by polluted runoff. Instigating protection from non-point source pollution is difficult in a rural, largely undeveloped town such as Salisbury. Public education can help landowners understand the impacts of their landscaping, gardening and other practices on water resources, including their own drinking water supplies. Limiting the amount of salt on roadways offers another effective way to reduce NPS.

## Land and Forestry Resources

The *Conservation Lands Map* depicts the conservation lands, public and quasipublic lands, and scenic vistas noted here in this section.

### Scenic Vistas

Being situated on relatively high ground between the Blackwater and Merrimack River valleys, much of Salisbury affords scenic vistas of the surrounding region. Salisbury is located to the east of Mt. Kearsarge, and many locations in the western part of the Town afford views of this monadnock. Certain locations in the eastern part of the Town have good views across the Merrimack River Valley.

## Current Use

As of 2006, there were 17,323 acres of land listed with the Town Assessor as in Current Use. The Conservation Commission intends to continue promoting this practice by working with landowners to place lands in Current Use into permanent easements.

# **Agricultural Resources**

A recent study by Dr. Laurence Goss of the Institute for New Hampshire Studies at Plymouth State University revealed that the state's agricultural sector is strong, diverse, and growing – with an estimated value of \$2.3 billion, supporting nearly 20,000 direct and indirect jobs – although the face of New Hampshire agriculture has changed dramatically in recent decades. Where the land once supported "commodity crops" such as vegetables, wholesale apple production, dairying, eggs and poultry, New Hampshire's commercial agriculture sector today thrives with small farms and horticultural operations that serve niche markets such as organic fruits and vegetables, pick-your own fruits, direct-to-restaurant sales, grass-fed beef and lamb, "free-range" poultry, wine grapes, cut flowers, and nursery crops. A decade ago, New Hampshire had about a dozen farmers' markets; today we have about 60, as well as a growing number of community-supported agriculture (CSA) operations, where community members buy "shares" in late winter/early spring in exchange for weekly deliveries of fresh produce throughout the growing season. Enterprising farmers also operate a variety of tourism-related activities, collectively called agro-tourism, promoting themselves as tourist destination sites that attract visitors to participate in agricultural activities.

Such agriculture-related tourism also includes "scenic travel," which involves people taking back roads to enjoy pastures, orchards, fields, barns, and farm animals. Scenic tourists contribute \$139 million and 1,664 jobs to New Hampshire's economy.

Salisbury currently supports only one full-scale family farm. Many families still plant vegetable gardens, raise a few chickens for eggs or meat, and/or raise beef, pork, and lamb for the family table.

But with rapidly rising fuel costs, mounting concerns about food safety, and increased participation in "buy-local" campaigns, opportunities abound in this still-rural community for residents to plant more home and market gardens, develop CSAs and pick-your-own operations, organize a Salisbury farmers' market, or raise a few animals for market. Because these activities help sustain ecological services and maintain the rural character most Salisbury residents cherish, town officials should promote them vigorously and include agricultural and horticultural values when drafting ordinances and reviewing development plans.

Prime farmland soils are described nationally as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and are also available for these uses. In New Hampshire, prime farmland soils are:

- Soils that have an aquic or udic moisture regime and sufficient available water capacity within a depth of 40 inches to produce the commonly grown cultivated crops adapted to New Hampshire in 7 or more years out of 10.
- Soils that are in the frigid or mesic temperature regime.
- Soils that have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches.
- Soils that have either no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to New Hampshire to be grown.
- Soils that have a saturation extract less than 4 mmhoc/cm and the exchangeable sodium percentage is less than 15 in all horizons within a depth of 40 inches.

- Soils that are not frequently flooded during the growing season (less than a 50 percent chance in any year or the soil floods less than 50 years out of 100.)
- The product of the erodibility factor times the percent slope is less than 2.0 and the product of soil erodibility and the climate factor does not exceed 60.
- Soils that have a permeability rate of at least 0.06 inches per hour in the upper 20 inches; and
- Soils that have less than 10 percent of the upper 6 inches consisting of, rock fragments larger than 3 inches in diameter.

### Forest Resources

Historically and today, trees predominate in the New Hampshire landscape. More than 84 percent of New Hampshire's and nearly 88 percent of Salisbury's land base is forested

Because forests provide the scenic backdrop to everyday life and the economic activity forests support is widely distributed, many residents take for granted the importance of the forests to our economy and our quality of life.

The annual contribution of forest-based manufacturing and forest-related tourism and recreation to the New Hampshire economy is more than \$2.6 billion. (source: <u>http://www.dred.state.nh.us/divisions/forestandlands/bureaus/director/index.htm</u>) This forest economy supports about 20,000 jobs statewide.

In fact, the state Division of Forest and Lands reports that each 1,000 acres of forestland in New Hampshire supports 2.0 forest-based manufacturing jobs and 2.3 forest-related tourism and recreation jobs.

The growing importance of renewable biomass fuels and long-rotation forestry as "carbon sinks" will likely increase the economic value of New Hampshire forests in the near future.

Although we can quantify the direct economic value of forest products such as lumber, biomass fuels for, firewood, Christmas trees and wreaths, maple syrup, and the jobs they provide, the large tracts of unfragmented forestland best-suited to commercial harvesting also provide numerous ecosystem services, which include air and water purification, flood protection, aquifer and groundwater recharge, natural air conditioning, wildlife habitat, and numerous opportunities for recreation and spiritual recharge. A number of factors determine the type of tree cover that occurs throughout Salisbury's abundant forested land areas chief among them is soil type. As they have done with respect to identifying agricultural soils, the Natural Resources Conservation Service has developed an interpretation-based forestry soil type classification map for the entire state of New Hampshire. A description of each group class, as defined by NRCS, follows:

### Forest Soils Type 1A

Approximately 15 percent of Salisbury's soils are Type 1A Forest Soils. These soils favor shade-tolerant hardwoods, such as *American beech (Fagus grandifolia)* and sugar maple (*Acer saccharum*). These soils comprise loamy soil types on 3 to 15 percent slopes of the Becket, Dixfield, Henniker, Marlow, Ondawa, Podunk, Skerry and Sunapee series.

### Forest Soils Type 1B

Approximately 60 percent of Salisbury's soils are Type 1B Forest Soils. These soils favor tolerant hardwoods, such as American beech (*Fagus grandifolia*). These soils comprise a wide variety of sandy and loamy soil types on 3 to 15 percent slopes, too numerous to mention here.

## Forest Soils Type 1C

Approximately 5 percent of Salisbury's soils are Type 1C Forest Soils. These soils are highly responsive to softwood production with limited hardwood competition, especially white pine (*Pinus strobus*). These soils comprise outwash sands and gravels on 3 to 15 percent slopes of the Becket, Dixfield, Henniker, Marlow, Ondawa, Podunk, Skerry and Sunapee series

### Town Forests

Salisbury has no Town Forests at present. However, included in the objectives for the Town's Natural Resources is the goal of developing one or more Town Forests within the next ten years, either by outright purchase or purchase of development rights or conservation easements.

### Forest Management

Currently, the Conservation Commission reviews all applications submitted to the State of New Hampshire to conduct logging in Salisbury. During 2005, occasional inspections of these operations by the Conservation Commission have resulted in identification of minor issues that were quickly resolved by the logger in charge of the operation.

### Tree Farms

Much of the land designated as Current Use functions as Tree Farms. These areas provide not only renewable timber harvests, but also wildlife habitat and

watershed protection that are vital to the Town's ecosystem. Many of these privately-owned lands remain available for recreational uses, such as hiking, riding, and snowmobiling. Due to the many benefits, the establishment and proper management of Tree Farms should be encouraged in the future.

## **Geologic Resources**

## Surficial and Bedrock Geology

Surficial geology across Salisbury is dominated by glacial features, including drumlins, contoured bedrock hills, kame terraces, and broad expanses of glacial till. A few locations have been identified as sources of sand and gravel in commercial quantities, and have been mostly exploited at this time. The single exception to the dominantly glacial terrane is in the Blackwater River valley, where fluvial deposits predominate. Surfical, unconsolidated deposits are generally thin throughout Salisbury, with the depth to bedrock generally shallow.

Bedrock outcrops are common across Salisbury, and the bedrock geology has been mapped by the U.S. Geological Survey. The *Bedrock Geology Map* depicts the bedrock geology of Salibury. Following approximately along the path of Route 4, bedrock beneath the Town is divided into two major types. The two types of rock are separated by an ancient fault, which presents little seismic danger in this epoch. To the east of Route 4 are Silurian age metasediments of the Rangely, Perry Mountain, and Smalls Falls Formations. These rocks range from schists to gneisses, and are very strongly banded. To the west of Route 4, are Devonian age slightly metamorphosed intrusive rocks of the Kinsman Granodiorite and the Spaulding Tonalite. These rocks are derived from the granitic intrustions that give our State its nickname.

With the exception of a small former copper mine located on the eastern flank of Mount Kearsarge, there are no known deposits of economic minerals of note.

### Hills and Mountains

Five major hills are found in Salisbury. These hills, mostly named for prominent settlers, are Sawyer, Bean, Lovering, Searles and Racoon Hills. The tops of these hills are approximately 1,000 ft above sea level. The dominant feature of the landscape in Salisbury is Mount Kearsarge, which is located along the western edge of Town. Although the top of the mountain is in Warner and Wilmot, the eastern slopes of the mountain comprise the highest land in Salisbury, over 1,700 ft above sea level.

Steep Slopes

The commonly exposed bedrock of Salisbury often occurs in small ledges and other outcrops. Many of these slopes are excessive, and are unsuitable for development, and also restrict access to other lands.

## Excavation Materials

Based on review of NRCS soil data for Salisbury, Salisbury's surficial deposits include materials that represent potential sources of economic quantities of sand and/or gravel. The following soil types are probable sources of sand: Adams Loamy sand, Adams-Lyman Complexes, Champlain Loamy Sand, Champlain-Woodstock Complexes, Colton Loamy Fine Sand and variants, Croghan Fine Sandy Loam, Hermon Fine Sandy Loam and variants, Monadnock Gravelly Fine Sandy Loam, and variants, Ondawa and Podunk Fine Sandy Loams (these soils are frequently flooded), Skerry Fine Sandy Loam and variants, and Sunday fine Sandy Loam (these soils are occasionally flooded). The following soil types are probable sources of gravel: Colton Loamy Fine Sand and variants, Hermon Fine Sandy Loam, Loamy Sand and variants and Skerry Fine Sandy Loam and variants. The preceeding lists omit certain soils that are listed as probable sand or gravel sources, but are also listed as hydric soils, and would be unlikely sites for quarrying operations. It is also notable that many of the sandy soils are also classified as "farmlands of local importance" by NRCS. Where such soils occur on relatively flat slopes, the benefits of restricting quarrying in order to preserve farmland should be considered during the quarry permitting process.

A small number of sand or gravel quarries are located in Salisbury. These include quarries located on Bay Road (Merkes), Plains Road, (Wunderlich), and a recently permitted gravel quarry on Bog Road (Reil). Older, former quarries were located on West Salisbury Road and New Road. Town ordinances regarding the permitting and operation of such operations were updated in 2005 to meet changes in State standards, and will be applied to all active quarries in Town.

# Wildlife

Salisbury's extensive natural landscape supports hundreds of species of native wildlife, all of which require certain types of habitats and features to survive. Over the past few decades, New Hampshire has been the fastest-growing state in the northeast, and has lost an average of 20,000 acres of forests, farms, and wetlands to roads in each of the past 20 years to housing developments, strip malls, and other human uses. Remaining habitats become increasingly fragmented and impacted by such extensive conversion, and lose their capacity to provide the many services they once did, including clean air, clean water, forest products, and habitat for wildlife.

Although Salisbury still has large areas of natural landscape, the town has invested nothing in land conservation, so the potential for development to quickly and drastically change the look and character of the town is enormous.

The New Hampshire Fish and Game Department has identified habitat types that are especially important for wildlife in their guidebook *Integrating Wildlife Habitat into Community Planning*. Salisbury – because of its location and the updating of our Master Plan – is one of three New Hampshire towns that has been chosen to participate in the *Strategic Natural Resource Planning Pilot Project*. The project will use such tools as the *Wildlife Action Plan* and *Natural Services Network* to identify the location of critical habitat and natural resources that Salisbury can use for strategic land use planning.

The following sections describe the values of various habitat types for native wildlife:

### Agriculture and other open lands

- Grasslands and other open lands support many wildlife species
- Grassland habitat and associated species have declined in NH and the Northeast
- Agricultural soils are critically important for growing crops
- Local land-based economy, locally grown food, energy conservation, and wildlife habitat protection are reasons to conserve agricultural lands

### Deer yards

- Deer need mature stands of softwood to survive the winter
- In the southern half of the state, deer yards have shrunk in size and are more scattered
- Softwood stands provide critical winter habitat for many species of bird and mammals

### Floodplains

- Floodplains store water during heavy flooding, and trees and shrubs stabilize the bank from erosion
- Deep, rich soils support diverse plants, which provide food and shelter for many wildlife species.
- Nut and fruit producing trees and shrubs are essential food sources for deer, bear, and many species of birds.
- Rich food sources in spring and fall make floodplains extremely important for migratory birds.

- Very little floodplain forest habitat remains in NH, as most floodplains were converted to agriculture by the early settlers, and much of this land has been subsequently developed.
- The Silver maple forest along the Blackwater is typical of undisturbed floodplains, and has been identified by the NH Natural Heritage Bureau as a rare forest type.

# Habitat for threatened and endangered species, and species of conservation concern

- Salisbury has a few documented species that are listed or of Conservation Concern, including osprey, Blanding's turtle, wood turtle, although there are likely several more plants and animals that are uncommon or rare.
- The greatest threats to wildlife, rare or common, are loss and degradation of habitats and fragmentation of the landscape. Some species and habitats are rare and unique, not only within the Town, but also within the state and the Northeast. These include silver maple floodplain forest, rocky, south-facing slopes, unfragmented blocks of undeveloped land, vernal pools, wetlands, bogs and caves.

# Shorelines

- Undeveloped shorelines of rivers, lakes, and ponds are rare and vulnerable to development.
- Natural vegetation protects the shoreline from erosion, helps maintain water quality, and provides important wildlife habitat.
- Species that require large bodies of open water (loons, osprey, eagle, etc) need a large area of undisturbed habitat around their nest sites

# Unfragmented blocks of habitat

Large blocks of habitat can accommodate natural disturbance regimes, which result in landscapes that have "patchiness", with uneven-aged forest stands, openings caused by tree-fall, etc. Natural disturbance factors include fire, wind, ice storms, hurricanes, insect outbreaks and other pathogens, and beavers. Fire is uncommon in the Northeast, except for in areas with deep sandy soils, such as the Ossippee Pine Barrens and along the Merrimack River, which historically supported pine barrens. Beavers are the most consistent disturbance factor, and before being nearly extirpated from the state during the 1700's, greatly influenced the landscape by flooding hundreds of acres. Although beavers have made a remarkable recovery, their activities are limited, and there are no massive beaver dams and ponds to support large heron colonies and many other species. Large forest blocks are important to forest interior birds, such as wood thrush, ovenbird, and many other songbirds. Species that evolved in large forested landscapes lack defensive mechanisms for nest parasites, such as the brownheaded cowbird, and the excessive predator activity associated with small forest patches that have a high edge-to-interior ratio. Most predators concentrate along edges, such as a field/forest interface, but will explore the interior of a forest patch, often for long distances. Forest interior birds attempting to nest in a small block of habitat face a much higher chance of predation and parasitism than those nesting in large, unfragmented blocks.

# Travel Corridors/Connectivity

Wildlife need to travel across the landscape to find food, shelter, mates, and to disperse among populations. Birds are fairly unrestricted in their ability to disperse, but mammals, reptiles, and amphibians are very susceptible to mortality when trying to cross roads, housing developments, and other inhospitable areas. Small, slow moving species, such as turtles, snakes, salamanders, and frogs, are extremely vulnerable to road mortality. Wideranging species, such as moose, bear, and bobcats, also tend to cross roads frequently, and sometimes unsuccessfully.

Turtles, for example, need to travel from the streams or wetlands where they hibernate, to vernal pools where they feed in early spring. Females then must find a nest site, and may travel more than a mile away from their normal range. During overland travel, these species are vulnerable to road mortality, being found and kept as pets, and predation.

It is essential for such species to have travel corridors between the different habitats they need throughout the year.

### Wetlands

About 1/3 of all native wildlife require wetland or aquatic habitat for all or part of their life cycle.

#### Streams

- Vulnerable to degradation, with few regulations for crossings, etc
- Important for water quality downstream
- Support many species, including trout, salamanders, invertebrates
- Need enough buffer to maintain input of organic nutrients, keep shaded, and prevent erosion and runoff

Invasive alien species

Invasive-alien aquatic plant species known to occur in Salisbury are limited to purple loostrife, *Lythrum salicaria*.

Alien-invasive terrestrial plant species known to occur in Salisbury include Japanese knotweed, *Polygonum cuspidatum*; Oriental bittersweet, *Celastrus orbiculatus*; autumn olive, *Elaeagnus umbellate*; Japanese barberry, *Berberis thunbergii*; and multiflora rose, *Rosa multiflora*.

#### NATURAL RESOURCE CONCERNS

Some of the most important natural resource concerns facing Salisbury involve the need to fully identify existing natural resources, developing and putting into action appropriate management plans to use or conserve those resources, and also educating the public about those resources. Many of the goals associated with this Chapter aim at satisfying these concerns.

#### **Contamination of Water Resources**

There is an overall concern in the central New Hampshire region for maintaining high water quality throughout the area; this concern includes private wells. A goal of this Chapter is to identify present and potential sources of pollution that may affect any surface and ground water resource in town. Though point pollution sources are easier to identify and mitigate, the desire to identify and alleviate non-point pollution source is also an important goal. Practical steps such as implementing local water testing programs, continuing hazardous waste days and "roadside" trash clean-up days as all tactics which helps to decrease potential pollution of water resources.

### **Development Sprawl**

The concept of sprawl, as it applies to the central New Hampshire region, refers to haphazard and widespread, automobile-dependent, low-density land development which occurs beyond the edge of traditional service and employment areas.

Sprawl's noted effects on natural resources typically include fragmentation of the landscape, increased potential for water contamination, permanent loss of traditional agricultural land and forested areas, and increased local property taxes to fund new community infrastructure needed to accommodate the needs of sprawl development.

It is the goal of the Salisbury Planning Board to avoid this situation by channeling future development away from the town's most important natural

lands where agriculture and forestry-related land uses have been deemed important and toward those areas of town which are medium- to high-density residential in nature, which already contain high-capacity transportation corridors and a built-up primary community infrastructure capable of handling new development.

# Loss of Undeveloped Lands ("Open space")

As discussed elsewhere in this Chapter, Salisbury's existing open spaces serve a number of important roles. First and foremost, they provide essential ecosystem services that protect and sustain human and environmental health. They also provide critical wildlife habitat, provide opportunities for many forms of public recreation, and preserve the town's rural character.

With this in mind, a goal of this Chapter could be to identify the Town's most valuable natural resources and develop a plan that will conserve them for future generations.

## **REGULATORY CONSERVATION TECHNIQUES**

Many techniques can help the Town conserve natural resources. Regulatory protection measures modifications to the Zoning Ordinance, Subdivision Regulations, and Site Plan Regulations.

# NON-REGULATORY CONSERVATION TECHNIQUES

Volunteer, non-regulatory efforts to conserve land are recognizable and are often more appreciated than regulatory requirements. They work hand in hand with regulatory methods to serve the community's conservation interests.

# **Conservation Easements**

A conservation easement is a permanent, legally binding, agreement that ensures that certain uses will never be allowed on that property. Conservation easements typically prevent development uses such as construction, subdivision and mining, while permitting and promoting uses such as agriculture, horticulture, forestry, wildlife habitat, scenic views, recreation, watershed protection and education. A conservation easement typically exists between a willing landowner and a qualified government or non-government steward, who assumes responsibility for ensuring tat the provisions of the easement are followed. Each easement is tailored to the interests of the landowner, the steward and the unique characteristics of the property. Land affected by a conservation easement can be sold or deeded by the original owner and subsequent owners, but the easement is binding on all future owners.

### **Management Agreement**

Management agreements primarily focus on a particular feature of open space administration. Such agreements can be custom-tailored to any specific situation, such as the following:

## Right-of-Way for Trails

The Town may protect open spaces along a recreational trail corridor through the use of this type of management agreement. The right-of-way could be arranged and exist as a legal agreement between the Town or nonprofit organization and the owner(s) of the land where the trail is located.

## Wildlife Corridors

Local private and public management plans that strive to protect open spaces associated with the natural movement and migration of wildlife is another practical use for management agreements. Typically, a management agreement for the protection or administration of a recognized wildlife corridor seeks to regulate how land in that corridor is used.

## Buffers Between Uses

Written agreements which relate to the establishment and maintenance of buffer areas between incompatible land uses can be used to ensure that activities related to development and growth do not have a negative impact on the ecosystem services, rural character, and scenic qualities valued by residents.

### **Dollars and Sense of Open Space**

This educational workshop developed by UNH Cooperative Extension and the Society for the Protection of New Hampshire Forests shows that open space brings in more revenue to a town than it requires in services. This value is greatly increased if one imputes a value to the essential ecosystem services undeveloped natural lands provide.

### SUMMARY

Salisbury has a number of natural resources: many large, unbroken tracts of meadow and forestland that support numerous species of wildlife and native plants, the Blackwater River with largely undeveloped shorelands, thousands of acres of undisturbed wetlands, several ponds, the eastern side of Mount Kearsarge, features that residents both appreciate and are determined to protect.

The Master Plan, based upon opinions expressed by the members of the Conservation Commission, as well as the community as a whole, includes several key objectives with respect to Salisbury's natural resources:

- To protect valuable natural resources and the essential ecosystem services\* they provide
- To preserve quality of life and the rural character of the Town by conserving open space, protecting important natural resources and preserving scenic vistas.
- To educate Town officials and the citizens of Salisbury about natural resources.
- To preserve the valuable wildlife habitat currently abundant in the Town.
- To preserve and enhance natural recreational resources.

That Salisbury still has these natural resources available for preservation in the early 21st Century is a tremendous opportunity. Salisbury still has the opportunity to enact the changes necessary to avoid the over-development fates of other New Hampshire towns, but it must act soon.

## MAPS

Natural Resources Land Use Map Water Resources Map Conservation Lands Map Potential Conservation Focus Areas Bedrock Geology