

Natural Resources

Introduction

The Town of South Hadley has a wealth of natural resources. The Mount Holyoke Range and the Connecticut River are integral to the Town's identity and have shaped the Town's form and land use pattern through their relationship with other Chapters, such as recreation, visual quality, economic activity, and open space. The preservation of these natural resources is critical to the Town's ecological integrity, its aesthetic character, and its appeal to residents and visitors.

Consistent with the communications principle of this Comprehensive Plan, among the most crucial needs related to South Hadley's natural resources is simply greater information and communication about them. While there is a strong community desire to enhance environmental quality through conservation and public management, information about the type, location, condition, and protection or restoration needs of South Hadley's resources is not readily available or widely understood. Improving information and communication to support resource conservation is the key focus of the recommendations in this Chapter.

This Chapter summarizes the historic and contemporary role of the Town's natural resources, and emphasizes the multiple roles that natural resources play in the Town's planning efforts. While planning for natural resources is often thought of in terms of land conservation or protective regulations, natural resources also have played a critical role in shaping the Town's design, community character, recreation and open space, and economic development activities. The goals and recommended actions for the Natural Resources Chapter, and the information needs that are highlighted, are intended to promote and emphasize these links between natural resources and other community planning goals.

Identification of Issues

Through the public gatherings, subcommittee meetings, input of town and regional organizations' staff, and review of existing documents and reports, the following issues were identified:

- Inadequate data on the community's environmental resources
- Need for monitoring and measurement of the community's environmental resources' quality and condition
- Consideration of the community's natural resources in local planning and development activities
- Connecting the community's protected natural resources
- Protecting endangered natural resources
- Communicating information on the location, quantity, and quality of the community's resources

Natural Resource Goals

In addition to several land and open space preservation goals discussed in the *Open Space and Recreation Chapter*, the following outlines the primary natural resource goals of the community. These goals differ from many of those contained in the *Open Space and Recreation Chapter* in that the focus is shifted away from the land and the landscape and to the environment and its systems.



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| NR-1 | A comprehensive, ongoing inventory and assessment of the Town's natural resources to provide the basis for actions to enhance the environmental quality and conditions of our air, land, and water. |
| NR-2 | Preservation and protection of the community's signature natural landscapes - the Mount Holyoke Range and Connecticut River. |
| NR-3 | A network of protected forests, streams, riverfront and other important natural resource lands which enhances the community's environmental health and quality of life. |
| NR-4 | Sustainable development based on the protection, restoration, and enhancement of our natural resources. |
| NR-5 | Broad and thorough communication and understanding of South Hadley's natural resources and their functions and values. |

Natural Resource Inventory



The Town of South Hadley occupies approximately 11,712 acres (18.41 square miles) and is bounded by the southern slopes of the Mount Holyoke Range to the north and the Connecticut River to the west. It is situated at the southern edge of Hampshire County and within the land of the Pioneer Valley. For any given community, certain regional characteristics often serve to influence open space and recreation planning to a greater extent than others. This is particularly true for the Town of South Hadley with respect to both the Mount Holyoke Range and the Connecticut River.

While only a portion of J.A. Skinner State Park, which encompasses more than 1,100 acres of mostly forest land, lies in South Hadley, it is rich in natural resources and has a diverse landscape which includes mountain woodlands, farm land, wetlands, streams, and the Connecticut River shoreline.

Although much of the land within the Pioneer Valley is primarily associated with the Connecticut River basin, the boundary which South Hadley shares with Hadley straddles a large portion of one of the few mountain ranges in Eastern North America which runs from east to west. This orientation provides a sharp contrast between the types of vegetation found on the north and south facing slopes of the range.

Understanding the physical relationships between geologic, landscape and water features is important in planning to protect and enhance natural communities, visual and historic landscapes, and the vital water resources supporting the Town's population and habitats. The natural communities within South Hadley – areas where the combination of vegetation, geology, and water resources supports a particular type of habitat - span multiple properties, making it essential to evaluate the relationship of the natural communities to current and planned conservation land.

Geology and Soils

A long history of geological activity has contributed much to South Hadley's form and function today. Volcanoes, glacial scouring, and continental drifts shaped the topography and many of the natural resources that support the community, including groundwater characteristics, and rock and soil characteristics.

The 'bones' of what is known today as the Connecticut Valley resulted principally from geological events that occurred 220 to 180 million years

ago during the Triassic Period, in which two faults were formed on either side of the Valley. Separation of these two faults created a low point that eventually became the Connecticut Valley.

Evidence of earlier life forms, including dinosaur tracks and petroglyphs, has been found in South Hadley and the surrounding region. Additionally, several sedimentary and igneous rocks comprise the geology of South Hadley and are shown in Table 5-1. South Hadley also is home to “Titan’s Pier,” a columnar structure of greenstone along the Connecticut River that was the subject of many 19th century illustrations and writings.

**Table 5-1
Geological Rock Characterization**

| Formation | Description |
|-------------------------|--|
| Sugarloaf Arkose | Weather resistant sandstone containing fragments of feldspar. |
| Hitchcock Volcanics | A dark igneous rock, formed as a result of volcanic cones mixing with uncemented arkoses. |
| Holyoke Basalt | Also known as diabase or traprock, a type of stratified rock containing feldspar crystals. |
| Second Sugarloaf Arkose | The second formation of Sugarloaf Arkose, containing coarser sediments than the first. |
| Granby Turf | Combination of fragments including volcanic ash. |
| Chicopee Shale | Fine grained rock formation resulting from glacial advance and retreat. |
| Titans Piazza | Columnar traprock formation. |

The presence of various sedimentary and igneous rocks in South Hadley was the result of several geological events in the region’s past. Many of these events, occurring millions of years ago, led to the formation of the topographical and ecological landscapes seen today. Table 5-2 demonstrates some of the more significant geological events in the region’s past.

**Table 5-2
Significant Geological Formations within South Hadley**

| Formation | Source | Description | Significance |
|---------------------|---|---|--|
| Mount Holyoke Range | Formed approximately 200 million years ago largely by cooling lava flow and | Seven mile mountain ridge that runs from Belchertown to Hadley, | The Mount Holyoke Range provides a wealth of scenic and recreational |

| | | | |
|--------------------|---|--|---|
| | shaped by glaciers. | approximately 1,000 feet at its peak. | resources, as well as significant ecological habitat. |
| Connecticut River | The present Connecticut River formed approximately 11,000 years ago at the end of the last ice age. | Largest river in New England, approximately 407 miles long. | The Connecticut River was used in the early days as a corridor for transportation and commerce. Today the river provides of recreational opportunities and critical ecological habitat. |
| Connecticut Valley | The separation of two faults due to continental drift, approximately 200 million years ago, and the subsequent sinking of the land. | The Connecticut Valley stretches from Connecticut to the border of New Hampshire and Quebec, within New England. | The Connecticut Valley, nestled among the various ranges and adjacent to the Connecticut River, provides a rich agricultural and cultural landscape. |

The Mount Holyoke Range

The Mount Holyoke Range in South Hadley is a chain of mountains stretching from Mount Holyoke at the eastern bank of the Connecticut River in an easterly direction to Bare Mountain. The gaps or “notches” which occur between the individual peaks in the chain are a result of the cracking underlying volcanic basalt by geologic faults, followed by erosion of the cracks over time. The Range’s distinctive profile dominates South Hadley’s skyline. The significance of the Mount Holyoke Range to the community and the region cannot be overstated.

Historically, the cultural, recreational and economic aspects of South Hadley have been influenced by the variation in landforms: from the nearly level Connecticut River floodplain of the south and west, through gently sloping, fertile eastern terraces, to the steep intrusive outcroppings of the Mount Holyoke Range which rise to elevations of over 1000 feet above the valley floor to the north. Together, these two aspects of South Hadley’s physical environment, the range and the river, serve to create a strong base for recreation and open space planning, not only within the Town of South Hadley but also within a regional context.

Trails and Parks: The bony spine of the Mount Holyoke Range defines the entire northern boundary of South Hadley. Included in this area is a portion of the Joseph Allen Skinner State Park, approximately 1,100 acres of which are located within South Hadley. Included in the state park is the prominent Summit House, actually located in Hadley, which housed a very popular and prestigious nineteenth century resort.

A six (6) mile segment of the Metacomet-Monadnock Trail traverses the ridgeline of the Mount Holyoke Range along the northern border of South Hadley through the Skinner State Park. Another 5.5 miles of the Trail continues easterly through the Mount Holyoke Range State Park along the Granby-Amherst-Belchertown borders. The entire Metacomet-

Monadnock Trail (from Long Island Sound to New Hampshire) was recently designated a National Scenic Trail.

The Range and Local History: Prospect House (Summit House), which was built in 1851 as a hotel, complete with a steam-powered tramway and 70 guest rooms, drew distinguished guests and internationally known celebrities such as Charles Dickens, William Wordsworth and Jerome Napoleon Bonaparte. Those who retreated here were, typically, the wealthy who could afford the time and money to get away. The resort managed to survive its harsh mountain environment until 1938 when most of the buildings on site were destroyed in the powerful hurricane of that year. A subsequent storm in 1941 destroyed the tram and its shelter.

The Mount Holyoke summit is nationally important for its historical and cultural attributes and exceptional views of the Connecticut River Valley, Vermont, and New Hampshire. The view of the Oxbow from Mount Holyoke after a thunderstorm was the setting for Thomas Cole's 1836 painting "The Oxbow," a major work of the Hudson River romantic period in American painting. The overgrown remains of the cable car track that served to transport visitors to the top are still present upon the slopes.

Acquisition and Protection: The history of the Mount Holyoke Range State Park began in 1940 with the donation by Joseph Allen Skinner to the State of the remains of the Prospect House and 375 adjoining acres of mountainous land. The Park is operated as a passive recreation area with the emphasis on trail use. In 1953, the first long-range acquisition and development planning was proposed for the area. It was not until the formation of the Mount Holyoke Range Citizen's Advisory Committee (HRCAC) in 1969 that more active planning was initiated, resulting in "A Plan for the Protection of the Mount Holyoke Range" in 1973. With this proposal, the DCR established its primary objective for the Mount Holyoke Range State Park: to preserve the scenic and recreational values of the range. This was to be accomplished through the acquisition of all unprotected lands above an elevation of 450 feet, as well as other lands located below this baseline, which meet the scenic and recreational objectives.

The resulting "ultimate acquisition boundary" map, endorsed by the HRCAC in 1982, outlined approximately 5,000 acres targeted for protection, 2,000 of which were, at the time, already under public ownership of some type. In 1975, acquisition began in earnest with the purchase of 320 acres in Amherst. To date, over 2,500 acres have been added to the total Mount Holyoke Range State Park system. Currently, public use of the park centers around relative "passive" recreation only,

including year-round hiking, cross-country skiing, limited snowmobiling, horseback riding, trail running, mountain biking, and limited picnicking. Motorized recreational vehicles are prohibited due to the potential for erosion impacts, and hang-gliding, though tolerated, is not actively promoted on the mountain.

These planning efforts, however, have not succeeded in permanent conservation of the entire range, and there are still challenges and threats to its integrity. The Mount Holyoke Range was designated by Scenic America in 2000 as one of ten “Last Chance Landscapes” due to the threat of development and relative lack of controls.

In 2001, The Kestrel Trust, a local land trust serving the Pioneer Valley area, working in partnership with other organizations and municipalities throughout the Mount Holyoke and Mount Tom region held a “Summit on the Range” and launched an initiative to encourage more regional consideration of the Mount Holyoke Range and the Mount Tom Range on the west side of the Connecticut River. This initiative began with the day-long community planning session where people from throughout the region met to consider issues and concerns confronting the Mount Holyoke Range. Subsequently, The Kestrel Trust and the Pioneer Valley Planning Commission coordinated with regional municipalities and nonprofit organizations in an effort to create a regional framework for protection of the Mount Holyoke Range. This effort included a Memorandum of Agreement signed by the various communities, including South Hadley, committing to take actions to protect the resources of the range. Other related steps included work on a model Zoning Bylaw amendment to regulate development on the Mount Holyoke Range.

South Hadley participated in the discussions for development of a model Zoning Bylaw which focused on ridgeline and steep slope development restrictions. Over the past 10 years, the South Hadley Planning Board has proposed, and Town Meeting has adopted several measures to limit developments affecting the Mount Holyoke Range:

- Excluding Major Earth Excavation and Fill activities from being allowed to occur north of Pearl Street;
- Prohibiting cell towers north of Pearl Street;
- Inclusion of the visual impact of cell towers on the Mount Holyoke as a consideration when permitting such towers in town;
- Prohibiting use of Flexible Development within the area north of Pearl Street.

Water Resources

While the Connecticut River is the most prominent of South Hadley's waterways, the Town also is home to four lakes, several significant tributary streams to the Connecticut River, and several important expanses of wetlands. Some of these resources are well documented, but other important water features, such as ponds, vernal pools, forested wetlands, and smaller tributaries to the main tributary streams, are not well documented. A key theme of this Plan and chapter is to support greater information, communication, and stewardship around these water resources because of their multiple roles and benefits in South Hadley.

While the majority of the Town's water resources beyond the Connecticut River are located in the more rural, northern half of Town, recognizing and managing resources in the historically developed sections in the southern half of South Hadley is just as important to the health of the Town's natural systems. Some of the significant stream corridors pass through South Hadley Falls, and are affected by development in this area.

Surface Waters

Rivers, streams and wetlands serve many different functions; they serve as corridors and habitat for wildlife, link ecological communities, and contribute to the town's scenic, recreational, and educational values.

Connecticut River. The Connecticut River is the longest river in New England. Running from its headwaters near the Canadian border, this river's watershed encompasses approximately 11,000 square miles, and drops by over 2,400 vertical feet from headwaters to mouth (near Essex, CT).

The Connecticut River is designated as an American Heritage River, which allows the communities to work in partnership to carry out several conservation and development projects. Water quality in the Connecticut has been improving in recent decades, with most of its length designated Class B (swimmable/fishable), and some portions Class A (drinkable). The Connecticut River adjacent to South Hadley is Class B.

Historically, many communities maintained joint storm drainage and sewer collection systems - known as Combined Sewer Overflows (CSO). Consequently, during heavy storm events, sewer plants would experience dramatically higher flow demands which diminished the quality of treatment. Therefore, the use of CSO's is now prohibited and

all communities are required to eliminate them from their systems. While other communities are still working on this goal, South Hadley utilized its own resources and eliminated its last CSO in 2008.

The Connecticut River watershed encompasses a large network of 38 major tributaries, encompassing over 20,000 miles of streams that support nearly 500 species of fish and wildlife, 1,500 species of invertebrates and nearly 3,000 species of plants. Ten federally listed endangered or threatened species live within this watershed. The River's watershed is principally forested (80%), with 12% in agricultural use, 5% in wetland and other waters, and 3% in developed land - including the portions of South Hadley Falls and the adjacent cities.

South Hadley's western boundary is formed by over 6 miles of the Connecticut River. South Hadley joins the cities of Holyoke, Chicopee and Springfield, and the towns of Agawam, West Springfield, and Longmeadow to comprise the so-called "urban riverfront." This important section of the river (also known as the "urban reach") is described in a September 1987 study by the Connecticut River Action Program as one of four distinctive "reaches" of the river's 68-mile course through Massachusetts.

With a collective population of over 350,000, according to the 2000 U.S. Federal Census Decennial, the urban reach of the river offers opportunities unavailable in many urban environments, including water-based recreational activities, such as boating, canoeing, fishing and riverside walks. The strong presence of this major water resource in South Hadley serves to provide all of the above recreation activities and significant aesthetic beauty, as well.

The Holyoke Dam is operated under a license originally granted in 1949 by the Federal Energy Regulatory Commission (FERC). The current license was granted in 1999 for a 50-year term subject to numerous conditions. While nearly all of the measures have at least indirect impact on South Hadley, of particular significance to South Hadley are conditions which require

- Preparation and implementation of a Comprehensive Recreation and Land Management Plan (CRLMP)
- Implementation of measures to protect a portion of property along the Connecticut River and Bachelor Brook, and Stony Brook
- Development of a park along the Connecticut River south of the Texon building
- Implementation of a system to monitor use of the Connecticut River and shoreline erosion measures

- A plan for disposition of the Texon building
- Resolution of issues related to Cove Island
- Implementation of a new means of regulating the water flow

Initially, the license was granted to Holyoke Water Power Company however, in 2001 the license (along with the dam and associated project lands) was transferred to Holyoke Gas and Electric (HG&E). With this transfer, all of the license obligations shifted to HG&E. Numerous stakeholders, including the Town of South Hadley, participated in preparation of the CRLMP and implementation of the other general measures required under the license. The CRLMP was approved by FERC in 2004.

An agreement between Holyoke Water Power Company and HG&E provided a form of Conservation Restriction for a depth of 300 feet along the Connecticut River, Bachelor Brook, and Stony Brook on properties then owned by Holyoke Water Power Company. However, the Town, using a variety of funding sources, purchased the property and placed the lands into permanent conservation.

Several projects required directly by the dam license and others resulting from subsequent activities are to result in new riverfront and historic parks in South Hadley Falls.

- A Lower Riverside Park is mandated by the dam license. South Hadley officials have worked with HG&E to develop plans for this park which is to be situated between the Texon building and the Route 116 bridge. Envisioned as a passive recreation area, amenities are to include some stone dust trails, picnic tables, and an overlook to view the remains of a portion of the historic South Hadley Falls Canal.
- Upper Gatehouse Park is to be developed north of the Texon building and extend to include the older gatehouses. This park is required under a 2001 mitigation agreement which arose from the demolition of the Texon building boiler house and two smoke stacks.
- Disposition of the Texon building was originally expected to result in renovation and conversion of the building. However, it is now likely that the building will be demolished. Since the Texon building has been deemed eligible for the National Register of Historic Buildings and the South Hadley Falls Canal is listed on the National Register, demolition of the Texon building will require mitigation for the action's impacts on historic resources. South Hadley officials have worked to try to develop an agreed upon set of mitigation measures. However, this effort has not been successful and Army Corps of Engineers

Pond (inland) means any open body of fresh water with a surface area observed or recorded within the last ten years of at least 10,000 square feet. . . . may be . . . naturally occurring or man-made Ponds contain standing water except for periods of extended drought. . . . [However], the following man-made bodies of open water shall not be considered ponds:
 (a) basins or lagoons which are part of wastewater treatment plants;
 (b) swimming pools or other impervious man-made basins; and
 (c) individual gravel pits or quarries excavated from upland areas unless inactive for five or more consecutive years.
<http://www.mass.gov/den/se>

08/30/2010 Adopted

is expected to determine the appropriate set of measures. The Town has been seeking to have a new park linking the Lower Riverside Park site and the Upper Gatehouse Park site as well as restoration of an appropriate segment of the South Hadley Falls Canal.

Tributary Streams. South Hadley has four lakes, six major streams and several ponds. Major water bodies include Lithia Springs Reservoir, Upper Lake and Lower Lake, and the Leaping Well Reservoir.

The tributaries and watersheds of Bachelor Brook, Buttery Brook, and Stony Brook are the best-known in Town, but the Town is also home to Leaping Well Brook, Elmer Brook, Judd Brook, White Brook, and Dry Brook. These streams and their contributing watersheds are not especially well-documented. Developing a comprehensive data base would benefit the development review and regulatory process, as well as local stormwater management, stewardship, and recreation efforts. This would also improve understanding of the impacts of, for example, inadequate setbacks from streams, which can lead to erosion, flooding hazards, and a decline in water quality and habitat.

Wetlands. Wetlands occur along the brooks, streams, ponds, and rivers of South Hadley, and in low-lying, poorly drained depressions. They provide groundwater and aquifer recharge, help control seasonal flooding, prevent pollution by filtering contaminants that enter the system, and provide nesting, food, and habitat for a variety of wildlife species. Wetlands also add to the natural beauty of the landscape and are often a place people like to visit. There are approximately 925 acres of documented wetlands in South Hadley, not including open waters. These wetlands include land adjacent to rivers and ponds along with swamps, wet meadows, beaver ponds, and some of the lands within the FEMA-defined 100-year flood area.

For over 35 years, Massachusetts has recognized the benefits of wetlands and enacted laws and regulations to protect these natural resources areas from adverse development. The Massachusetts Wetland Protection Act (MGL c. 131 § 40) as amended by the 1996 Rivers Act protects the interests or functions provided by wetlands, including:

- Protection of water supply and groundwater by providing recharge through infiltration of water into the ground
- Retaining natural flood storage capacity and preventing storm damage by absorbing floodwaters
- Sustaining fisheries
- Protection of wildlife habitat

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the growing season. They include swamps, marshes, bogs, vernal pools, and hydric (wet) soils. They perform three important functions:

- Water filtration
- Moderate changes in water supply
- Breeding ground for fish and wildlife as well as stopover for migratory waterfowl.

Administration of the Wetlands Act and Rivers Act is a joint function of the Massachusetts Department of Environmental Protection and local Conservation Commissions.

South Hadley adopted a local wetlands bylaw in 2005 in order to further protect these important resources. The bylaw includes a local 50-foot “Conservation Zone” within which no alteration can occur and a 100-foot buffer zone, where work may be approved if certain conditions are met to protect the resource areas. Continual evaluation of how well this program is working, and improved technical information such as suggestions for buffer plantings and fencing to protect wetlands and enhance aesthetic values, will be needed to make the program effective.

A **vernal pool** is a seasonally flooded wetland that functions as wetland habitat in the spring, and as upland habitat for the rest of the year.

Vernal pools. Vernal pools are isolated depressions that are seasonally flooded. These “spring wetlands” provide essential breeding habitat for some amphibians, and play an important role in the overall hydrologic system and natural community structure of the area. However, because they are dry for most of the year, they are often an “invisible” resource that is difficult to protect.

The most recent State data available¹ indicates that the Town of South Hadley presently has three certified vernal pools, and approximately 78 potential vernal pools, according to the Natural Heritage and Endangered Species Program (NHESP) criteria. These, again, are not as well documented as is needed mostly due to private property concerns and a lack of sufficient staffing resources (personnel, funding, volunteers, etc.) to enhance their protection through the Town’s development review and conservation planning processes. South Hadley has had a few vernal pool surveys done by student interns, and has mapped those that appear from a habitat and hydrology standpoint to be functioning as vernal pools. Completing a more detailed vernal pool survey, and making the community far more aware of these resources and their locations would facilitate their protection.

Aquifers

An **aquifer** is an underground reservoir that supplies public or private drinking water.

The Dry Brook wells, which supply potable water for Fire District 2, are infiltrated by water recharged through underground aquifers in the northern section of Town. A Water Supply Protection District (Section 7N of the South Hadley Zoning Bylaw) was established in 1992 to improve and protect the quantity and quality of surface ground water in this aquifer. Provisions of the Water Supply Protection District restrict the intensity of development in areas not served by public sewer and

¹ Data obtained from MassGIS in April 2009.

limit the use and storage of chemicals which could damage the water supply.

Protecting aquifers is an important natural resource consideration for any community, but particularly for South Hadley because of the link to drinking water supplies. Aquifers generally have cleaner water than surface reservoirs because as water flows down through the soil, pollutants are filtered out. However, pollutants from roads, parking lots, farming operations, and lawn maintenance can seep into and contaminate aquifer recharge areas. Information and communication are especially important tools in protecting aquifers, since individual actions can have a substantial impact on the health of these resources.

Stormwater runoff is water from storm events that does not infiltrate into the ground but rather runs off the surface of the land and eventually into waterways. Impervious surfaces increase the volume and velocity of stormwater runoff and carry pollutants such as fertilizers, pet waste, and sediment into streams and surface waters.

Managing stormwater runoff. Stormwater runoff is another area of natural resource protection where individual and neighborhood-scale actions can have a substantial impact on overall environmental quality. Managing stormwater runoff from suburban developments, and highly urban areas, is an increasing area of concern. Recent advances in understanding and managing stormwater runoff recommend “Low Impact Development” (LID) approaches which are intended to reduce the amount of impervious surface, mimic the natural hydrologic system as closely as possible, and rely less on engineered structures (i.e. detention ponds) to achieve stormwater management and erosion control. Examples of this approach include the use of native vegetation in buffer strips, open channels and rain gardens to trap and filter pollutants in stormwater runoff. LID also helps to reduce stormwater runoff volume by infiltrating as much rain as possible back through the soil and into the water table.

Under Federal law, all municipalities must require applicants for construction sites greater than one acre to file a Stormwater Pollution Prevention Plan that meets local approval. Integrating stormwater management with land development regulations is an area where South Hadley can make strides both in protecting water quality, and in complying with increasing Federal regulations.

In response to Federal requirements, South Hadley adopted a Stormwater Management Bylaw in 2008. This portion of the Town’s General Bylaws applies to any disturbance of land over one acre or more. Developers and property owners are required to consider stormwater treatment systems or “best management practices” when building new impervious surfaces such as homes, roads and driveways.

Vegetation

South Hadley is home to many natural vegetation communities, but the overwhelming type of cover is forest land.

Forest Land

Consistent with other forest lands in the Pioneer Valley region, the forest land in South Hadley varies according to location, slope, soils and hydrology. The south slopes of the Mount Holyoke Range tend to be slightly warmer, supporting oaks and hickories, while the cooler slopes foster pines and hemlock.

Forests are a critical component of South Hadley's ecosystem, rural character, renewable energy potential, air quality, and wildlife habitat. However, the quantity and quality of some forest land in South Hadley is believed to have deteriorated since 1991, largely due to fragmentation. In 1991, approximately 56 percent of the forest lands were considered of prime productivity compared to approximately 48 percent today. Approximately 30 acres of this forest land is assessed under Chapter 61 (Massachusetts Forest Tax Law), which offers forest landowners the option of reduced taxation in exchange for participation in a forest management program that conserves many of the resource and natural values of the land. Some forest land is protected through varying designations, as shown in Table 5-3.

**Table 5-3
Summary of Private Forest Land Protection in South Hadley²**

| Designation | Description | Total Acreage |
|---------------|---------------------------|------------------|
| Chapter 61 | Forest Land | 30 acres |
| Chapter 61A | Wooded Agricultural Land | 368 acres |
| Chapter 61B | Wooded Recreational Land | 53 acres |
| Forest Legacy | Working Forest Protection | 100 acres |
| Total | | 551 acres |

² NOTE: Table 5-3 does not include protected land which is in farm usage (such as the McCray APR); two Orchards Golf Course 61B parcels which are predominantly open land; or land which is owned by the State or Town.

The Connecticut River riparian zone contains a rare and exemplary forest type especially adapted to the seasonal flooding, called the Northern Floodplain Forest. This type of forest consists of several vegetation zones, extending from the river and into the floodplain depending on tolerance for saturation. These species include highly tolerant species close to the river such as willows and green ash, and extend to beyond the river's edge to include red maple and sycamore trees. Identifying and conserving areas that support this type of natural community is vital for wildlife and bird habitat, and for water quality protection, as this type of floodplain forest provides flood storage, nutrient and sediment storage, and pollutant removal functions for the river.

Rare Species in South Hadley

“Rare species” include those classified by the Natural Heritage and Endangered Species Program (NHESP) as either threatened, endangered, or of special concern. At least fifty-nine (59) rare species of plants, fish and wildlife have been identified in South Hadley by the Natural Heritage and Endangered Species Program (NHESP) (see Table 5-4 and Table 5-5). Vascular plants account for 60% of the species.

Threatened Species An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
<http://www.fws.gov/endangered/glossary.html>

Endangered Species An animal or plant species in danger of extinction throughout all or a significant portion of its range.
<http://www.fws.gov/endangered/glossary.html>

Species of Special Concern A term referring to a species that has been documented to have suffered a decline that could threaten the species if allowed to continue unchecked or that occurs in such small numbers or with such a restricted distribution or specialized habitat requirements that it could easily become threatened within Massachusetts.
http://www.mass.gov/dfw/e/dfw/nhESP/regulatory_review/mosa/mosa_reg

Most of the rare species are associated with wetlands and river systems habitat. The floodplain forests of Bachelor Brook and Stony Brook are categorized by the NHESP as “Small River Floodplain Forests” and provide habitat for approximately 13 documented rare species. The recent acquisition of this land has significant positive impacts on the preservation of these habitats and rare species, but more of the floodplain forest remains unprotected.

Approximately 959 acres of land in South Hadley have been classified as “priority habitat”. The Connecticut River, Bachelor Brook, Stony Brook, Elmer Brook, and Dry Brook lie within “priority habitat” lands identified by the NHESP.

**Table 5-4
Rare Species in South Hadley – Vascular Plants**

| Taxonomic Group | Scientific Name | Common Name | MESA Status | Federal Status | Most Recent Observation |
|-----------------|--|----------------------------|-------------|----------------|-------------------------|
| Vascular Plant | <i>Acer nigrum</i> | Black Maple | SC | | 1985 |
| Vascular Plant | <i>Adlumia fungosa</i> | Climbing Fumitory | SC | | 2002 |
| Vascular Plant | <i>Alnus viridis</i> ssp. <i>crispa</i> | Mountain Alder | T | | 1985 |
| Vascular Plant | <i>Aplectrum hyemale</i> | Putty-root | E | | 1874 |
| Vascular Plant | <i>Aristida purpurascens</i> | Purple Needlegrass | T | | 1913 |
| Vascular Plant | <i>Asclepias verticillata</i> | Linear-leaved Milkweed | T | | 2007 |
| Vascular Plant | <i>Boechea missouriensis</i> | Green Rock-cress | T | | 2006 |
| Vascular Plant | <i>Bolboschoenus fluviatilis</i> | River Bulrush | SC | | Historic |
| Vascular Plant | <i>Carex glaucoidea</i> | Glaucous Sedge | E | | 2006 |
| Vascular Plant | <i>Carex grayi</i> | Gray's Sedge | T | | 2007 |
| Vascular Plant | <i>Carex lupuliformis</i> | False Hop-sedge | E | | 2006 |
| Vascular Plant | <i>Carex tuckermanii</i> | Tuckerman's Sedge | E | | 2007 |
| Vascular Plant | <i>Carex typhina</i> | Cat-tail Sedge | T | | 2007 |
| Vascular Plant | <i>Cerastium nutans</i> | Nodding Chickweed | E | | 2003 |
| Vascular Plant | <i>Clematis occidentalis</i> | Purple Clematis | SC | | 2006 |
| Vascular Plant | <i>Desmodium cuspidatum</i> | Large-bracted Tick-trefoil | T | | 2005 |
| Vascular Plant | <i>Elatine americana</i> | American Waterwort | E | | 2006 |
| Vascular Plant | <i>Eragrostis frankii</i> | Frank's Lovegrass | SC | | 1985 |
| Vascular Plant | <i>Liatis scariosa</i> var. <i>novae-angliae</i> | New England Blazing Star | SC | | 1933 |
| Vascular Plant | <i>Lygodium palmatum</i> | Climbing Fern | SC | | 2008 |
| Vascular Plant | <i>Mimulus alatus</i> | Winged Monkey-flower | E | | 2007 |
| Vascular Plant | <i>Morus rubra</i> | Red Mulberry | E | | 2000 |
| Vascular Plant | <i>Nuphar microphylla</i> | Tiny Cow-lily | E | | 2005 |
| Vascular Plant | <i>Ophioglossum pusillum</i> | Adder's-tongue Fern | T | | 1887 |
| Vascular Plant | <i>Oxalis violacea</i> | Violet Wood-sorrel | E | | 2006 |
| Vascular Plant | <i>Panicum philadelphicum</i> ssp. <i>philadelphicum</i> | Philadelphia Panic-grass | SC | | 1997 |
| Vascular Plant | <i>Platanthera dilatata</i> | Leafy White Orchis | T | | 1885 |
| Vascular Plant | <i>Podostemum ceratophyllum</i> | Threadfoot | SC | | 2001 |
| Vascular Plant | <i>Populus heterophylla</i> | Swamp Cottonwood | E | | 2002 |
| Vascular Plant | <i>Prunus pumila</i> var. <i>depressa</i> | Sandbar Cherry | T | | 1985 |
| Vascular Plant | <i>Rumex verticillatus</i> | Swamp Dock | T | | 2006 |
| Vascular Plant | <i>Salix exigua</i> ssp. <i>interior</i> | Sandbar Willow | T | | 1985 |
| Vascular Plant | <i>Scheuchzeria palustris</i> | Pod-grass | E | | 1934 |
| Vascular Plant | <i>Scleria triglomerata</i> | Tall Nut-sedge | E | | Historic |
| Vascular Plant | <i>Solidago ptarmicoides</i> | Upland White Aster | E | | 2006 |
| Vascular Plant | <i>Verbena simplex</i> | Narrow-leaved Vervain | E | | 1875 |

Fisheries and Wildlife

| | |
|------------|---|
| Fish | Shortnose sturgeon, Atlantic salmon, carp, yellow perch, bullhead |
| Amphibians | Wood frogs, red-spotted newts, salamanders |
| Reptiles | Spotted turtles, garter and black snakes |
| Mammals | Beaver, northern flying squirrel, gray squirrel, Virginia opossum, red fox, bobcats |
| Birds | Morning doves, downy woodpeckers, bald eagles, ruffed grouse, pileated woodpeckers, great horned owls, and red-tailed hawks |

Note: This is meant to be a representative list of wildlife in South Hadley and is not all-inclusive.

South Hadley is home to a variety of species of wildlife, including 23 “Rare Species” of fisheries and wildlife. Table 5-5 presents a list of Rare Species within South Hadley. Particularly noteworthy are the Barn Owl and the Shortnose Sturgeon, both of which depend on clean and protected waterways and adjacent lands of types found in South Hadley. The presence of these two well-known species could be an excellent way to focus attention on South Hadley’s natural resources and conservation needs in a positive manner, particularly for school children.

As discussed in this chapter, floodplain forests, forests and wetlands are some of the areas that provide critical habitat. Some of the larger blocks of protected lands, including the Bachelor Brook/Stony Brook Conservation Area, the Mount Holyoke Range, and other conservation lands, provide excellent habitat for several animal species, while also providing areas for certain types of passive recreation.

Wetlands and floodplain provide undisturbed waters, forage and trees for nesting, as well as critical habitats for fish and water species. Fish, amphibians, reptiles, mammals and birds all make their habitat in these areas. The Town’s forest lands also provide significant habitat for mammals and birds.

Several specific areas within the Town have been identified as significant contributors to the continued health and success of the region’s ecosystem. Bachelor Brook, Elmer Brook and Stony Brook are important fisheries in Town, with at least 37 fish species identified on these sites. The Natural Heritage and Endangered Species Program also has identified several areas that warrant special considerations due to their role in the region’s ecological system, such as 6.6 miles of the Connecticut River riparian zone, lands along Lithia Springs Road, the Moody Corner section of Town, and area around the Byran Conservation Area and landfill.

**Table 5-5
Rare Species in South Hadley – Fish and Wildlife**

| Taxonomic Group | Scientific Name | Common Name | MESA Status | Federal Status | Most Recent Observation |
|---------------------|-----------------------------|-------------------------------------|-------------|----------------|-------------------------|
| Amphibian | Ambystoma jeffersonianum | Jefferson Salamander | SC | | 1977 |
| Amphibian | Ambystoma laterale | Blue-spotted Salamander | SC | | 1999 |
| Amphibian | Ambystoma opacum | Marbled Salamander | T | | 1999 |
| Bird | Tyto alba | Barn Owl | SC | | 2005 |
| Butterfly/Moth | Rhodoecia aurantiago | Orange Sallow Moth | T | | 1999 |
| Dragonfly/Damselfly | Gomphus abbreviatus | Spine-crowned Clubtail | E | | 2005 |
| Dragonfly/Damselfly | Gomphus fraternus | Midland Clubtail | E | | 2005 |
| Dragonfly/Damselfly | Gomphus vastus | Cobra Clubtail | SC | | 2005 |
| Dragonfly/Damselfly | Gomphus ventricosus | Skillet Clubtail | SC | | 2003 |
| Dragonfly/Damselfly | Neurocordulia yamaskanensis | Stygian Shadowdragon | SC | | 2003 |
| Dragonfly/Damselfly | Stylurus amnicola | Riverine Clubtail | E | | 2005 |
| Dragonfly/Damselfly | Stylurus scudderii | Zebra Clubtail | SC | | 2003 |
| Dragonfly/Damselfly | Stylurus spiniceps | Arrow Clubtail | T | | 2004 |
| Fish | Acipenser brevirostrum | Shortnose Sturgeon | E | E | 1999 |
| Mussel | Alasmidonta undulata | Triangle Floater | SC | | 1997 |
| Mussel | Alasmidonta varicosa | Brook Floater (Swollen Wedgemussel) | E | | 1997 |
| Mussel | Lampsilis cariosa | Yellow Lampmussel | E | | 2006 |
| Mussel | Leptodea ochracea | Tidewater Mucket | SC | | 2003 |
| Mussel | Ligumia nasuta | Eastern Pondmussel | SC | | 1997 |
| Mussel | Strophitus undulatus | Creeper | SC | | 1997 |
| Reptile | Carphophis amoenus | Eastern Worm Snake | T | | 1976 |
| Reptile | Glyptemys insculpta | Wood Turtle | SC | | 2007 |
| Reptile | Terrapene carolina | Eastern Box Turtle | SC | | 2006 |

Source: http://www.mass.gov/dfwele/dfw/nhosp/species_info/town_lists/town_s.htm#southhadley

E = Endangered

T = Threatened

SC = Special Concern

Natural Resource Challenges & Planning Needs

South Hadley relies on the health of its natural resources, their ability to support local wildlife and ecosystems, their visual character and quality, and their role in the natural landscape. As shown in the Open Space and Recreation Chapter, natural resources can also provide ample scenic and recreational opportunities as well as provide for working landscapes. Features such as the Mount Holyoke Range and the Connecticut River, and views from McCray's Farm and Canal Park; come up repeatedly in surveys and public input, as the best-known and most important natural resource features.

The Comprehensive Plan development process has noted that resources are not connected, highlighted, or well understood. Better documentation and communication and more active, engaged stewardship of their natural resource values are required.

Areas of Environmental Significance

As noted previously, South Hadley's natural resources have played a vital role in forming the community and continue to be significant. The five (5) areas within the Town that have been identified as areas of environment significance are:

- Mount Holyoke Range
- Farmland
- Scenic Roadways
- Riverfront
- Aquifer Recharge Areas

Mount Holyoke Range

The issue of what lands are "protected" and not protected in the Mount Holyoke Range is one of the most important issues for the Town's natural resource and open space planning, because of the visual and physical prominence, natural resource aspects, and economic importance of the Mount Holyoke Range to the Town. While large areas of the Range are in State or other ownership, some parcels have conservation easements and others allow access for recreation and other uses. The nature of the easements on the Mount Holyoke Range - and on other large woodland tracts with similar ecological values, and threats - is poorly understood and poorly documented.

Farmland

Although integral to the Town's character, the amount of farmland in South Hadley has been declining. Farming has very important

implications for the environment, landscape and economy. Efforts need to be undertaken to preserve farming in a manner which enhances the local economy while preserving natural resources values. Continued cooperation between the Town and local farmers to establish land protection is strongly encouraged. In addition, South Hadley should move quickly to explore the potential role that programs such as Community Supported Agriculture (CSA) and regional promotion of local food and farm products can play in enhancing the number and viability of options for farmers to maintain productive lands within the Town.

In 2009, Town Meeting created and the Selectboard appointed an Agricultural Commission. The role of farming and Community Gardens in South Hadley is discussed in more detail in the Open Space and Recreation Chapter.

Scenic Roadways

There are currently three roadways within South Hadley that are designated as scenic roadways pursuant to MGL, Chapter 40, Section 15C: Pearl Street, Alvord Street, and a portion of River Road. This designation offers protection for trees and stone walls when their alteration is to be part of a roadway improvement. The protection of land beyond the roadway, in these cases, is beyond the scope of protection offered by this designation. A comprehensive assessment of other roadways as to their appropriateness for designation as scenic roadways has not been undertaken.

Route 47 is designated a Scenic Farm Byway by the U. S. Department of Transportation. This designation affords the Town an opportunity to protect the scenic landscape along Route 47 through a grants cooperatively managed with the Pioneer Valley Planning Commission, Town of Hadley and local land trusts. Preserving the land adjacent to a roadway also has important consequences for wildlife by providing a buffer zone.

Protection of these roadway environments, particularly the mature trees that line many of the scenic roadway segments would maintain and enhance the community's character.

Riverfront

Riverfront areas are attractive to developers as they often offer impressive views and direct access to recreation opportunities. The development of riverfront land can have significant negative impacts on the wildlife and ecology of the region, particularly by fragmenting or

removing sections of Northern Floodplain Forest that are essential for habitat, flood storage, and pollutant removal. Maintaining portions of undeveloped Connecticut riverfront has been a major goal because of its importance to the ecosystem and wildlife that depends on it. Furthermore, the natural riverfront offers a beautifully pristine landscape that is a critical component of South Hadley's identity. The Bachelor Brook-Stoney Brook land acquisition serves as a recent success story. Ownership and conservation status of the riverfront in South Hadley needs to be documented, making information-gathering an important step before a preservation action plan can be developed.

Aquifer Recharge Areas

The Town has a Water Supply Protection Overlay District which protects some of the aquifer recharge area. The threat for contamination or significant runoff alteration is very possible and the Town has identified these areas as being significant areas of concern. As with conservation land, understanding the ownership status and zoning designations of lands in immediate proximity to aquifer recharge is the essential first step in developing a prioritized action plan for protection of these essential resources.

Potential Sources of Contamination

Due to its largely residential character, South Hadley is not as threatened by environmental problems as much as some of the nearby communities. However, the community does have potential sources of environmental problems; such as, sanitary landfills and industrial uses with hazardous materials.

Sanitary Landfills

Sanitary landfills have been operated in South Hadley and Granby for many years. Both facilities are situated in close proximity to each other with the South Hadley landfill located in the southeast corner of the town along Industrial Drive and New Ludlow Road. The Granby Landfill is accessed in Granby but abuts East Street in South Hadley. Residential development has occurred in recent year in close proximity to both facilities.

South Hadley Sanitary Landfill. Due to some unregulated waste disposal practices early in its history, the landfill in South Hadley is a designated priority "21E" site under the Massachusetts Oil and

Hazardous Materials Release Prevention and Response Act, enacted in 1983 to protect supplies, wetlands and wildlife. A landfill leak, as detected in 1991, can have detrimental effects on the surrounding natural environment and public health. Since the detection of the leak, the Town and its landfill operator have taken the necessary measures to limit the exposure of the present contamination, and ensure the prevention of further leaks into the groundwater.

The active landfill today reflects modern construction methods and operates in compliance with all local, state, and federal regulations designed to be protective of human health and the environment. The Town's Board of Health continues to monitor the landfill and surrounding area to help ensure acceptable levels of air quality and minimal overall environmental impact. Signs are posted for no swimming or drinking of the water in areas of Buttery Brook down gradient from the landfill. With anticipated construction of a vertical expansion on a portion of the existing cells, the present landfill is scheduled to be able to continue to operate through June 2014. Options to further expand horizontally and increase the capacity of the landfill are being explored by the Town. One such option would extend the landfill's life as much as 10 additional years.

Granby Sanitary Landfill. This facility is located adjacent to South Hadley. A recent Special Permit allowed the construction of a leachate tank on East Street in South Hadley. Fortunately, there have not been any reports of leaks from this landfill.

Industrial Uses with Hazardous Materials

South Hadley's history as a Connecticut River industrial town, particularly, but not exclusively, in South Hadley Falls and the southern part of the Town, has led to the presence of several industrial operations utilizing hazardous materials. For many years, industrial facilities operated in the absence of strict environmental regulations and safeguards required of today's facilities. In the fall of 2006, an industrial accident occurred at a plant near the landfill that resulted in a temporary hazardous materials incident. It should be noted that while much attention is focused on large facilities, small facilities utilized and continue to utilize, hazardous materials. These locations need to be effectively managed.

Other Planning Issues

Wildlife Habitat/Natural Community Fragmentation: With the further development of South Hadley, open spaces are decreasing and wildlife habitats are becoming more fragmented. Although South Hadley has preserved some large parcels of open space, links need to be made to allow wildlife movement between these open spaces. As the habitats decrease, there is a greater chance of losing species native to the area.

The road network that divides South Hadley also makes wildlife movement more difficult. Safe corridors linking lands across these major roadways would be beneficial to animals and humans alike. Green overpasses or underpasses could be effectively integrated with the built environment to encourage wildlife movement.

Finally, increased sensitivity to the habitats of the diverse species that populate South Hadley and its environs, including the bald eagle, barn owl, and the shortnose sturgeon, is needed. Any future development or point and non-point source pollution activities should undergo great scrutiny, because these are federally protected species.

Floodplain Management and Regulation: South Hadley's history and identity center around the development of the riverfront and floodplain for economic use in South Hadley Falls, where community use and development of the riverfront is vital to the goals of this Plan. But north of South Hadley Falls along the river, the community's key issue is balancing recreational access with conservation and enhancement of a vital natural community and protection of water quality.

Compensatory Storage is an artificially excavated, hydraulically equivalent volume of storage with Special Flood Hazard Areas used to balance the loss of natural flood storage capacity when artificial fill or structures are placed within the flood plain. (Frankfort, Illinois Floodplain Regulations)

Floodplain mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. This is achieved through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk, and flood insurance that protects financial investment.

<http://www.fema.gov/government/mitigation.shtml#1>

Floodplain regulations have a substantial and important impact on development and redevelopment planning within South Hadley Falls. Because of the risk of damage to life and property, and associated costs for property damage, FEMA flood insurance rules strongly discourage new development and structures within the 100-year flood zone. This can hamper redevelopment, especially in older industrial areas like South Hadley Falls that owe their location, land use pattern, and historic buildings to the presence of river falls that once powered mills and other industry. This puts environmental regulations squarely at odds with redevelopment goals in many cases. A generalized map depicting the floodplain in the South Hadley Falls is in the Map Appendix of this plan.

Working with the state to explore compensatory storage and floodplain mitigation will be essential to allowing both continued use of the

riverfront in South Hadley Falls, and vital redevelopment and economic development activity, while protecting natural resource values elsewhere. Flexibility and sound information on the riverfront's dynamics and resources will be needed.

Mount Holyoke Range and Connecticut River Protection and Recreation Access: Protection of and access to the Mount Holyoke Range and Connecticut River are prime concerns (see the *Open Space and Recreation Chapter* for additional information). Any type of development within the 100-year flood boundary area outside South Hadley Falls and the Canal Park area requires serious evaluation for its potentially negative effects, and the efforts of organizations such as the Connecticut River Watershed Council should help protect the river and other streams in Town. Conservation easements, fee simple acquisition and more emphasis on the Mount Holyoke Range GOALS plan, as discussed in the *Open Space and Recreation Chapter*, are needed for further protection of the range.

Small Watershed Identification and Awareness: One of the least understood aspects of South Hadley's natural resources and systems is the network of streams and tributaries feeding the Connecticut River, extending literally from the Range to the River. Stream surveys and inventories, identification of risk areas and inputs, and watershed boundary delineation are needed to enhance our understanding of the multiple potential impacts on these vital streams.

Wetland and Vernal Pool Identification and Awareness: Lack of awareness of wetlands and their importance is an area that needs attention. While the Town has acquired some wetland areas and adopted a Wetlands Bylaw which offers additional protections, there is an apparent lack of public awareness of the need to protect these areas. This results in intentional and unintentional damage to wetlands and vernal pools, vandalism of conservation areas, and other actions which degrade these vital resources.

Landfill Operations and Closure: The Town has been aggressive in its efforts to protect current and future residents in the area surrounding the landfill. As the landfill continues to be used, and even expanded, continuation of these efforts by the Town and the landfill operator is needed. As the Department of Environmental Protection previously determined that this area is a priority 21E site and the Town and its landfill operator have worked diligently to address the DEP concerns, every precaution should be taken to continue to ensure public health and safety. Increasing development of homes in ever closer proximity to the South Hadley and Granby landfills require more care as to the operation and management of the facilities.

South Hadley’s landfill is projected, even with the most optimistic horizontal expansion, to be exhausted by 2024. Following closure and capping of the landfill, most of the landfill is to be used for conservation and recreation purposes. As the time for closure of the landfill approaches, South Hadley will need to begin a community-based process for planning reuse of the landfill. The close proximity of the Granby Landfill may offer an opportunity for a “regional” approach to reuse of both landfills when they are exhausted.

Natural Resources Goals



The Natural Resources goals continue with the Plan themes of sustainability, leading by example, communications, and managing towards an overall vision. Nearly all of the natural resources goals are closely interrelated with the Town’s goals for land use, visual character, cultural and historic resources, economic development, and especially open space and recreation. To the greatest extent possible, the goals and strategies presented herein should work in conjunction with the goals and strategies identified in the other Chapters, especially the Open Space and Recreation, and Cultural and Historic Resources.

| | |
|------|--|
| NR-1 | A comprehensive, ongoing inventory and assessment of the Town’s natural resources to provide the basis for actions to enhance the environmental quality and conditions of our air, land, and water. |
| NR-2 | Preservation and protection of the community’s signature natural landscapes - the Mount Holyoke Range and Connecticut River. |
| NR-3 | A network of protected forests, streams, riverfront and other important natural resource lands which enhances the community’s environmental health and quality of life. |
| NR-4 | Sustainable development based on the protection, restoration, and enhancement of our natural resources. |
| NR-5 | Broad and thorough communication and understanding of South Hadley’s natural resources and their functions and values. |

NR-1: A comprehensive, ongoing inventory and assessment of the Town’s natural resources to provide the basis for actions to enhance the environmental quality and conditions of our air, land, and water.

Objective 1-1: Compile a thorough and accessible inventory of the natural resources and natural resource conditions, integrating as many sources of information as possible.

Recommended Action 1-1-1: Document the watersheds, stream geomorphology, habitat conditions, and existing buffers of the Town's small streams, notably Elmer Brook, Stony Brook, Bachelor Brook, and Buttery Brook.

Recommended Action 1-1-2: Using available data collected from the water quality and other monitoring stations document the quality and condition of the Connecticut River and tributary streams in the South Hadley area .

Recommended Action 1-1-3: Compile daily water quality monitoring reports of the community's public water supplies.

Recommended Action 1-1-4: Using available data collected from air quality monitoring stations, document South Hadley area's air quality and condition.

Recommended Action 1-1-5: Using available data, document environmental health conditions (such as incidences of chronic illnesses, disease, etc.).

Recommended Action 1-1-6: Inventory parcels with known environmental contamination and parcels which pose the greatest risk of contaminating ground water resources with particular emphasis on the area covered by the Water Supply Protection District.

Recommended Action 1-1-7: Compile available data collected from existing water monitoring wells.

Recommended Action 1-1-8: Inventory and map properties with wells and/or septic disposal systems.

Recommended Action 1-1-9: Inventory and map locations of storm water detention basins.

Objective 1-2: Establish standards for air quality, water quality, and land-related conditions appropriate for South Hadley.

Recommended Action 1-2-1: Utilize available resources (such as, state and federal programs) to establish appropriate evaluation standards.

Recommended Action 1-2-2: Evaluate environmental data to identify environmental issues and possible mitigation/resolution strategies.

Recommended Action 1-2-3: Develop a 5-year plan for environmental improvement and long-term sustainability using established standards.

Recommended Action 1-2-4: Use environmental quality indices to support enhanced recreation opportunities and economic development.

NR-2: Preservation and protection of the community's signature natural landscapes - the Mount Holyoke Range and Connecticut River.

Objective 2-1: A full understanding of the existing level of protection and the potential actions that could affect the visual and environmental quality of the Mount Holyoke Range.

Recommended Action 2-1-1: Research, document, and map the current status of easements, public and private ownership of parcels and use of special tax assessment programs (such as Chapter 61 and 61A) within the Mount Holyoke Range.

Recommended Action 2-1-2: Identify key areas for preservation and priority conservation funding.

Objective 2-2: Secure the permanent protection of environmentally sensitive and historic visual resources of the Mount Holyoke Range.

Recommended Action 2-2-1: Use conservation investments and partnerships to further protect land in the Mount Holyoke Range.

Recommended Action 2-2-2: Encourage property owners to permanently protect the land they own on the Mount Holyoke Range.

Recommended Action 2-2-3: Create a dedicated funding source, including adoption of the Community Preservation Act, to provide assistance for enhancement and preservation of our natural resources.

Objective 2-3: Ensure that any development activity that takes place within the Mount Holyoke Range does not detract from the historic visual character and environmental function of the Range.

Recommended Action 2-3-1: Adopt and implement a Mount Holyoke Range Overlay District which incorporates ridge line protection and scenic uplands protection provisions.

Recommended Action 2-3-2: Develop and implement an Environmental Resources Overlay district.

Recommended Action 2-3-3: Identify Mount Holyoke Range land that may be appropriate for economic development which is in keeping with the character of the Pearl Street corridor.

Recommended Action 2-3-4: Develop and adopt clear Design Review Standards as part of a Design Review Bylaw to ensure that buildings are compatible with the Mount Holyoke Range's environmental setting from an aesthetic perspective.

Objective 2-4: Develop and implement strategies to secure the long-term health of the Connecticut River and its associated habitats.

Recommended Action 2-4-1: As a priority action item in this Plan, document and map the ownership status of lands along the Connecticut River.

Recommended Action 2-4-2: As a priority action item in this Plan, document and map the presence of, and opportunities for, public access along the riverfront.

Recommended Action 2-4-3: Document the location, extent and quality of the Northern Floodplain Forest along the Connecticut River, including its wildlife habitat and natural community functions and values.

Recommended Action 2-4-4: Implement measures such as an overlay district to improve protection of the Northern Floodplain Forest along the Connecticut River and its ecological integrity.

Recommended Action 2-4-5: Update the information from the 1987 Connecticut River Action Program urban riverfront study to reflect changing conditions in South Hadley.

Recommended Action 2-4-6: Adopt shoreline stabilization measures into a Town policy or bylaw to protect the Connecticut River shoreline.

Recommended Action 2-4-7: Ensure that any new access points to the Connecticut River protect river water quality, rare species habitat, and shoreline vegetation.

NR-3: A network of protected forests, streams, riverfront and other important natural resource lands which enhances the community's environmental health and quality of life.

Objective 3-1: Secure the permanent protection of environmentally sensitive forests and habitats.

Recommended Action 3-1-1: Inventory the ownership and structure of the community's forest lands to determine where fragmentation is occurring, and where there are opportunities to reduce fragmentation through conservation investments, participation in forest management programs, or changes in regulations and bylaws.

Recommended Action 3-1-2: Identify and work with owners of forest lands to increase enrollment in the Massachusetts Chapter 61 program for forest management.

Objective 3-2: Support integrated resource protection in review and regulatory processes.

Recommended Action 3-2-1: Develop a watershed study to determine whether additional stream setbacks and buffer provisions are needed to protect property from flooding and erosion hazards caused by development within the riparian zone.

Recommended Action 3-2-2: Conduct a follow-up assessment on implementation of the wetland bylaw to evaluate how the bylaw is working, what issues need to be addressed, and how the bylaw's requirements are playing out in new development approvals.

Objective 3-3: Implement habitat protection plans in ecologically sensitive areas.

Recommended Action 3-3-1: Identify, evaluate and map potential wildlife corridors, including regional and local connections to core habitat areas, vernal pools, and water resources.

Recommended Action 3-3-2: Evaluate opportunities and locations that could be used to facilitate wildlife crossings and connect habitat areas within the Town.

Recommended Action 3-3-3: Identify critical resource areas encompassing streams, ponds, vernal pools, floodplain, wetlands and other water bodies for conservation and preservation.

Recommended Action 3-3-4: Fully evaluate and document the wildlife habitat values and natural communities in South Hadley, possibly using the Shortnose Sturgeon, Bald Eagle and Barn Owl as "indicator" species for planning purposes.

Recommended Action 3-3-5: Document the condition of the Town's small streams and watersheds.

Recommended Action 3-3-6: Develop community involvement to address small stream and watershed concerns.

Recommended Action 3-3-7: In the course of updating local bylaws and regulations, ensure that any revisions consider and incorporate appropriate best practices for such environmental protections as stream buffers or shoreline setbacks.

NR-4: Sustainable development based on the protection, restoration, and enhancement of our natural resources.

Objective 4-1: Strategically highlight the Town's natural resources as key components in the Town's economic development, recreation, and land use planning.

Recommended Action 4-1-1: Promote the Town's natural resources as a distinct competitive advantage in attracting new residents, businesses, and investment.

Recommended Action 4-1-2: Benchmark South Hadley's natural resource strengths in comparison to other comparable towns in Western Massachusetts/Vermont/New Hampshire.

Recommended Action 4-1-3: Assess the role that the area's natural resources play in attracting residents, businesses, and tourism.

Recommended Action 4-1-4: Develop a public relations and advertising campaign that highlights the Town's natural resource attributes.

Recommended Action 4-1-5: Aggressively promote South Hadley's commitment to environmental quality.

Recommended Action 4-1-7: Capitalize on the abundant local and regional natural resource-based recreational opportunities.

Objective 4-2: Minimize and rectify the potential risks of contamination to our natural resources.

Recommended Action 4-2-1: To identify and target locations within South Hadley which are, or potentially could be, sources of contamination.

Recommended Action 4-2-2: In conjunction with assessments of infiltration and inflow, review the location and condition of wastewater collection systems to identify potential risks and sources of pollution.

Recommended Action 4-2-3: Compile and consolidate State information on hazardous materials sites and potential sources of contamination in South Hadley.

Recommended Action 4-2-4: Continue to monitor progress on expanding or closing the South Hadley and Granby landfills, and any potential impacts or needed remediation of nearby groundwater resources.

Recommended Action 4-2-5: Review the design, construction, and maintenance of stormwater "best management practices" both by the town and private developers to ensure that the Town is taking advantage of the most recent and effective approaches to low-impact development.

Objective 4-3: Ensure that town policies model and encourage resource conservation in development practices and municipal operations.

Recommended Action 4-3-1: Evaluate municipal water resources protection practices and recommend areas for improvement.

Recommended Action 4-3-2: Investigate the feasibility of increasing the enforcement of and fines associated with littering, polluting and inappropriately disposing of waste.

Recommended Action 4-3-3: Adopt a native landscaping and tree planting program throughout the Town.

Recommended Action 4-3-4: Commission and adopt a plan to provide for the long-term protection of public water supplies, including the use of land conservation coordinated with the Town's open space, recreation, and cultural and historical resource efforts.

Recommended Action 4-3-5: Use compensatory storage and mitigation effectively in South Hadley Falls, in support of the Town's resource conservation and economic development goals.

NR-5: Broad and thorough communication and understanding of South Hadley's natural resources and their functions and values.

Objective 5-1: A user-friendly, web-based interactive program for dissemination and collection of information regarding South Hadley's natural resources.

Recommended Action 5-1-1: Provide online access to the databases on South Hadley's natural resources and their conditions with linkage through the Town's website.

Recommended Action 5-1-2: To the extent appropriate, map information on South Hadley's natural resources and recreational opportunities.

Recommended Action 5-1-3: Provide easy intuitive access for site users to information and maps regarding South Hadley's natural resources and recreational opportunities.

Recommended Action 5-1-4: Provide an on-line or other interactive program for residents to submit updated information and observations regarding the natural resources (such as mapping of wildlife and bird sightings).

Objective 5-2: Foster and develop links which facilitate the understanding and protection of South Hadley's natural resources.

Recommended Action 5-2-1: Establish partnerships and aggressively pursue funding opportunities which support natural resource goals and objectives.

Recommended Action 5-2-2: Create an interactive structure for sharing information among agencies and organizations regarding the natural resources and their condition.

Recommended Action 5-2-3: Integrate the natural resources inventory and assessment into the community's schools (public and private) as a tool for teaching about the role of the natural environment.

Recommended Action 5-2-4: Develop an educational program about habitat and presence of South Hadley's Rare Species (Threatened and Endangered Species and Species of Special Concern) which also informs as to how these animals relate to the Town's natural resources and conservation efforts.

Recommended Action 5-2-5: Create new opportunities for community education and engagement (such as, new stream and watershed signage, stream team clean-up efforts, and "Keeping Track").

Recommended Action 5-2-6: Promote Community-Supported Agriculture (CSA) and other "farm-to-table" initiatives as a way to conserve farmland and protect natural resources.