

Natural Resources

Introduction

The Town of South Hadley has a wealth of natural resources, from valleys to mountains, streams to rivers. 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 elements, 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 visual and physical character, and its appeal to residents and visitors.

Consistent with the communications principle of this Comprehensive Plan, one of 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 natural history and the 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 a critical role in shaping the Town's visual design and community character. Understanding and creating policies for natural resources also supports planning for recreation and open space, and any economic development activities that flow from recreation. The goals and recommended actions for the Natural Resources Element, and the information needs that are highlighted, are intended to promote and emphasize these links between natural resources and other community planning goals.

Natural Resource Goals

In addition to several land and space preservation goals discussed in the *Open Space and Recreation Element*, 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 Element* in that the focus is shifted away from the land and the landscape and to the environment and its systems.

NR-1	To substantially improve the Town’s base of information on its environmental quality and conditions (air, water, land).
NR-2	To ensure that the Town’s natural resources, open space attributes, scenic vistas, and physical location between the Range and River, are recognized and strategically highlighted as key elements in the Town’s economic development, recreation, and land use planning.
NR-3	To establish and maintain a network of protected forests, streams, riverfront and other important natural resource lands, particularly in the Mount Holyoke Range and along the Connecticut River, for the environmental health and quality of life of the community.
NR-4	To develop and implement a communications plan that includes a thorough, accessible, and user-friendly inventory of South Hadley’s natural resources and their functions and values, and which supports strong public and private conservation stewardship consistent with the goals of this Plan.



Natural Resource Inventory



While only a portion of J.A. Skinner State Park, which encompasses more than 400 acres of 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, river corridors, and Connecticut River shoreline.

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.

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 largely contributed much to South Hadley's form and function today. Volcanoes, glacial scouring, and continental drifts shaped the Town's layout 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. The 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 shaped by glaciers.	Seven mile mountain ridge that runs from Belchertown to Hadley, approximately 1,000 feet at its peak.	The Mount Holyoke Range provides a wealth of scenic and recreational 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 a plethora 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.

The cultural, recreational and economic aspects of South Hadley have been historically influenced by a dramatic 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 both to the north and south as well as to the east.

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 large portion of the Joseph Allen Skinner State Park, approximately 86 acres of which are located within South Hadley. A six (6) mile segment of the Metacomet-Monadnock Trail (familiar to many of the more adventurous of the region’s inhabitants) reverses 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. Recent efforts have been successful in making the entire Metacomet-Monadnock Trail from Long Island sound to New Hampshire into a National Scenic Trail. Also included in the state park is the prominent Summit House, actually located in Hadley, which housed a very popular and prestigious resort and restaurant during the nineteenth century.

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 wealthier who could afford the time and money to get away. The



resort managed to survive its harsh mountain environment until 1938 when the tramway and most of the buildings on site were destroyed in the powerful hurricane of that year. 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. Until the mid 1950s, the Park was 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 above 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.

However, these planning efforts have not succeeded in permanent conservation of the 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 cooperated 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 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.

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 vernal pools, forested wetlands, and smaller tributaries to the main tributary streams, are less well documented but very important to the overall function and health of South Hadley’s environment. 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.

Also, 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. This section describes the Town’s water resources and also identifies those for which there is less information and a need for further work.

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 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.

Within South Hadley, over six and one quarter miles of the Connecticut River form the western boundary of the Town of South Hadley. 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 importation 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.

The Connecticut River is designated as an American Heritage River, which allows the Town to work in partnership with similar communities to carry out several conservation and development projects proposed during the nomination process. 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.

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. Development of the historic riverfront park encompassing the Gatehouses above the dam and the passive recreation area below the Gatehouse, as required by FERC and the Corps of Engineers, will significantly enhance community use.

As part of the relicensing of the Holyoke Dam, the Federal Energy Regulatory Commission (FERC) in 2000 required measures to protect a portion of property along the Connecticut River and Bachelor Brook, and Stony Brook. Northeast Utilities established a Conservation Restriction with Holyoke Gas & Electric (HG&E) for a depth of 300 feet along the Connecticut River on properties then-owned by Northeast Utilities along the Connecticut River, Bachelor Brook, and Stony Brook. After acquiring the Holyoke Dam and some related properties from Northeast Utilities in 2001, to fulfill its requirements under the FERC license, HG&E began planning development of a riverfront park in the South Hadley Falls area, drafted a Conservation Restriction on Cove Island, established new licenses for occupants of Cove Island, and began developing a dock and water withdrawal permitting system to regulate activities along the Connecticut River.

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.

Tributary Streams

According to the 2007 *Open Space and Recreation Plan (OSRP)*, the town has four major open water bodies, six streams and four minor open water bodies. The major water bodies are Lithia Springs Reservoir, Upper and Lower Ponds, and the Leaping Well Reservoir. The majority of South Hadley's population (approximately 70%) is served by Fire District 1, which draws water from the nearby Quabbin Reservoir in Belchertown. The remaining residents receive their water from the Dry Brook wells, under the jurisdiction of Fire District 2.

The tributaries and watersheds of Bachelor Brook, BATTERY 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 this type of information 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 and flooding hazards.

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 97 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.

The Massachusetts Wetland Protection Act (MGL c. 131 § 40) was originally enacted into law as the Hatch Act in 1972. The regulations can be found at 310 CMR 10.00. Amended by the 1996 Rivers Act, the 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

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. Wetlands regulations may prove challenging to implement through the development review process, as there often can be resistance to the limitations and the areas that are protected do not always appear to be valuable wetlands to the casual observer. 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.

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

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.

dry for most of the year, they are often an “invisible” resource that is difficult to protect.

The most recent 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 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, is a recommended action in this plan.

Aquifers

The Dry Brook wells, which supply much of the Town’s water, 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 the northern section of Town, near this aquifer.

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 the aquifer recharge areas and contaminate them. Information and communication are especially important tools in protecting aquifers, since individual actions can have a substantial impact on the health of these resources.

Managing Stormwater Runoff

Stormwater runoff is another area of natural resource conservation where individual and neighborhood-scale actions can have a substantial impact on overall environmental quality. Managing stormwater runoff from both suburban housing developments, and highly urban areas, is an increasing area of concern. Contained within the General Bylaws of the Town of South Hadley is a Stormwater Management Bylaw that requires developers to consider stormwater treatment systems or “best

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

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.

¹ Data obtained from MassGIS in April 2009.

management practices” when building new impervious surfaces such as homes, roads and driveways. 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.

Federal law has placed a greater emphasis on stormwater management. Regardless of size, 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.

Vegetation

South Hadley is home to many natural vegetation communities, but the overwhelming type of cover is forest land. Consistent with other forest lands in the Pioneer Valley region, the forest land in South Hadley varies according to location, slope, aspect, 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.

Forest Land

The South Hadley forest is 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 protected 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. A significant amount of forestland is protected through varying designations, as shown in Table 5-3.

**Table 5-3
Summary of Forest Land in South Hadley**

Designation	Description	Total Acreage
Chapter 61	Forest Land	30 acres
Chapter 61A	Agricultural or Horticultural Land	1,057 acres
Chapter 61B	Recreational Land	198 acres
APR/Forest Legacy	Agricultural Preservation Restriction / Working Forest Protection	245 acres
Total		1,530 acres

The Connecticut River riparian zone contains a significant forest type especially adapted to the seasonal flow of water of the river’s banks, 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.

Threatened and Endangered Species in South Hadley

According to the Natural Heritage and Endangered Species Program (NHESP), there are approximately 58 threatened and endangered species known to have occurred in South Hadley, and 959 acres of identified “priority habitat” lands. The majority (35) of these species are vascular plants, as shown in Table 5-4, while the remaining (23) species are fish and wildlife. 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. Besides the Connecticut River and Bachelor Brook, Stony Brook, Elmer Brook, and Dry Brook also lie within “priority habitat” lands identified by the NHESP.

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**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>Liatris 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. The “Rare Species” designation includes those that are endangered and threatened, but adds in those that are of “special concern.” 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. Also supporting significant habitat are many of the Town’s forest lands, supporting a high concentration of 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 have been identified as important fisheries in Town, with at least 37 fish species identified on these sites. The Natural Heritage 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 Connecticut River riparian zone, lands along Lithia Springs Road, portions of the Moody Corner section of Town, and the area around the Bynan 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 scudderi	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	Creepers	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 heavily on the health of these 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 Element, natural resources can also provide ample scenic and recreational opportunities as well as provide for working landscapes. Features such as the view from McCray's Farm; the view from Canal Park; the Mount Holyoke Range; and the Connecticut River come up repeatedly as the best-known and most important natural resource features, in surveys and public input, and provide a jumping-off point for greater resource information and communication.

While South Hadley has a significant portion of land in conservation or natural use of different forms, the Comprehensive Plan development process has noted that these resources are not connected, highlighted, or well understood, and require both better documentation and communication and more active, engaged stewardship of their natural resource values.

Areas of Critical Environmental Concern (ACECs)

Areas of Critical Environmental Concern (ACECs) are places in Massachusetts that receive special recognition because of the quality, uniqueness and significance of their natural and cultural resources. These areas are identified and nominated at the community level and are reviewed and designated by the Commonwealth's Secretary of Environmental Affairs. ACEC designation creates a framework for local and regional stewardship of critical resources and ecosystems².

The Mount Holyoke Range was identified and reviewed as a possible ACEC but did not receive official designation. There are ongoing questions of whether the Town should again pursue this designation for the Range. In addition to the Range, there are six areas within Town that have been identified as areas of critical environment at the community

² <http://www.mass.gov/dcr/stewardship/acec/>

level but not the state level. A discussion of these community-designated areas follows.

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 full conservation easements and others allow access for recreation and other uses that do not represent full conservation. The nature of the easements in the 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 is continually declining, usually lost to private development that continues to encroach upon the limited remaining farmland. Local farming has very important implications for the local environment, landscape and economy, and should be aggressively preserved. 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.

The role of farming in South Hadley is discussed in more detail in the *Open Space and Recreation Element*, as is the recently established Community Gardens located at the Town Farm. The Select Board formed a committee to explore creation of a community garden in June 2009.

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. The Town does have the opportunity now to protect the scenic landscape along Route 47 through a Scenic Byway grant 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. In concert with the recommendations of the Cultural & Historic Resources chapter of this Plan, it is a goal to work more aggressively to protect these roadway environments, particularly the mature trees that line many of the scenic roadway segments.

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. Additionally, the ownership and conservation status of much of the riverfront in South Hadley is being documented, making information-gathering an important step before a preservation action plan can be developed. 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 and untouched 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.

Aquifer Recharge Areas

The Town has a Water Supply Protection Overlay District which protects some of the aquifer recharge area, but leaves the areas in the immediate areas of the wells largely unprotected. 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 bedroom-community character, South Hadley is not as threatened by environmental problems as much as some of the nearby communities. However, the community does have a few potential sources of environmental problems within the Town: the sanitary landfill operation and the neighboring industrial zone, and a set of potentially contaminated sites.

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 was detected in 1991, can have detrimental effects on the surrounding natural environment. Since the detection of the leak, the Town and its contractor have taken the necessary measures to limit the exposure of the present contamination, and ensure the prevention of further leaks into the groundwater as contamination can have many negative consequences for the surrounding environment and public health.

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. Areas down gradient from the landfill are posted for no swimming or drinking of the water. The present landfill is scheduled to reach capacity at the end of 2010, however options to increase the capacity of the landfill are being explored by the Town.

Industrial Uses with Hazardous Materials

South Hadley's history as a Connecticut River industrial town, particularly in South Hadley Falls and the southern part of the Town, has led to the presence of several industrial operations utilizing

hazardous materials. These plants have, historically, not created many environmental issues, and industrial pollution due to current operations is not a major environmental concern. In the fall of 2006, an industrial accident did occur at a plant near the landfill that resulted in a temporary hazardous materials incident. Generally, however, the use of hazardous materials at commercial sites in South Hadley is not expected to impact open space or recreation since the materials are usually confined indoors and do not escape into the groundwater supply or water bodies.



Other Planning Issues

Wildlife Habitat/Natural Community Fragmentation: With the growing population 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. In other locations, green overpasses or underpasses have been effectively integrated with the built environment to encourage wildlife movement. However, the cost of building such green connections is relatively high.

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 represents a microcosm of many of the important, and extremely challenging balancing tests that must occur when a community needs to make use of its floodplain in some areas, and to protect it in others. 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.

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. The Texon building, for example, lies entirely within the 100-year flood zone, as does SHELD's current headquarters.

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 the prime concerns (see the *Open Space and Recreation Element* 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 Element*, 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, "stream teams," identification of risk areas and inputs, and watershed boundary delineation all are needed to enhance understanding of the multiple potential impacts on these vital streams.

Wetland and Vernal Pool Identification and Awareness: An apparent lack of awareness of wetlands and their importance is a shortfall 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.

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 elements, especially the Open Space and Recreation, and Cultural and Historic Resources.



NR-1	To substantially improve the Town’s base of information on its environmental quality and conditions (air, water, land).
NR-2	To ensure that the Town’s natural resources, open space attributes, scenic vistas, and its physical location between the Range and River, are recognized and strategically highlighted as key elements in the Town’s economic development, recreation, and land use planning.
NR-3	To establish and maintain a network of protected forests, streams, riverfront and other important natural resource lands, particularly in the Mount Holyoke Range and along the Connecticut River, for the environmental health and quality of life of the community.

NR-4	To develop and implement a communications plan that includes a thorough, accessible, and user-friendly inventory of South Hadley's natural resources and their functions and values, and which supports strong public and private conservation stewardship consistent with the goals of this Plan.
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NR-1: To substantially improve the Town's base of information on its environmental quality and conditions (air, water, land).

Objective 1-1: Establish metrics for air quality, water quality, and land-related conditions appropriate for South Hadley in support of the Comprehensive Plan.

Recommended action: Use state and federal resources for data gathering and evaluation, as needed.

Recommended action: Develop a 5-year plan for environmental improvement and long-term sustainability using established metrics.

Recommended action: Use environmental quality indices to support enhanced recreation opportunities and economic development.

Objective 1-2: Bring together a thorough and accessible inventory of the natural resources in South Hadley, integrating as many sources of information as possible, in a way that promotes appreciation and stewardship of South Hadley's natural environment.

Recommended action: Pursue funding and partnerships through Massachusetts DEP and DCR to document the watersheds, stream geomorphology, habitat conditions, and existing buffers of the Town's small streams, notably Elmer Brook, Stony Brook, and Bachelor Brook.

Recommended action: As a priority action item in this Plan, Town staff should work with the Pioneer Valley Planning Commission and Massachusetts DCR and DEP to develop a web-based, user-friendly inventory of natural resource information that is focused on directing site users to information and maps about South Hadley's many resources, both public and private.

Objective 1-3: To identify and target locations within South Hadley which are, or potentially could be, sources of contamination.

Recommended action: Commission and adopt a long-term plan to protect public water supplies, including the strategic use of land conservation to protect water

resources that dovetails with the Town's open space, recreation, and cultural and historic resource efforts.

Recommended action: 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: Compile and consolidate State information on hazardous materials sites and potential sources of contamination in South Hadley.

Recommended action: Continue to monitor progress on expanding or closing the South Hadley landfill, and any potential impacts or needed remediation of nearby groundwater resources.

Recommended action: 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 1-4: Ensure that town policies model and encourage resource conservation in development practices and municipal operations.

Recommended action: As part of a Sustainability Task Force or other initiative, evaluate municipal practices for "water-friendliness" and recommend areas for improvement.

Recommended action: Investigate the feasibility of increasing the enforcement of and fines associated with littering, polluting and inappropriately disposing of waste.

Recommended action: Adopt a strategic native landscaping and tree planting program throughout the Town.

NR-2: To ensure that the Town's natural resources, open space attributes, scenic vistas, and its physical location between the Range and River, are recognized and strategically highlighted as key elements in the Town's economic development, recreation, and land use planning.

Objective 2-1: Place South Hadley in a position of competitive advantage in attracting new residents, businesses, and investment through targeted promotion of the Town's natural resources.

Recommended Action: Benchmark South Hadley's natural resource strengths in comparison to those of other towns in Western Massachusetts/Vermont/New Hampshire.

Recommended Action: Work with local business groups to develop a public relations and advertising campaign that highlights the Town's natural resource attributes.

Recommended Action: Integrate strong natural resource and open space messages in all economic development planning initiatives and grant proposals.

Recommended Action: Aggressively promote South Hadley's commitment to environmental quality and natural resource-based recreation opportunities.

NR-3: To establish and maintain a network of protected forests, streams, riverfront and other important natural resource lands, particularly in the Mount Holyoke Range and along the Connecticut River, for the environmental health and quality of life of the community.

Objective 3-1: 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.

Objective 3-2: Gain a full understanding of the existing level of protection and the potential actions that could affect the visual and environmental quality of the Range.

Recommended Action: Research and map the current status of easements, state ownership, and private ownership of parcels within the Ridge.

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

Recommended Action: Identify Mount Holyoke Range land that may be amenable to economic development beyond forestry.

Recommended Action: Assess the Town's small streams and watersheds and develop community involvement around small watershed protection.

Recommended Action: In the course of updating the zoning bylaw, ensure that any revisions consider and incorporate appropriate best practices for such environmental protections as stream buffers or shoreline setbacks into South Hadley's regulations.

Objective 3-3: Secure the permanent protection of environmentally sensitive forest, habitat, and historic visual resources of the Mount Holyoke Range.

Recommended action: As a priority action item and essential step in the Town's natural resource strategy, carefully document and map the existing status of all easements, deed restrictions, and tax programs such as Chapter 61 applicable to all parcels in the Mount Holyoke Range.

Recommended Action: As a priority action item in this plan following from the first recommendation above, along with the Pioneer Valley Planning Commission, evaluate the ownership and structure of the Town's forest lands to see 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: Identify and work with owners of forest lands to increase enrollment in the Massachusetts Chapter 61 program for forest management.

Recommended action: Use conservation investments and partnerships to further protect land in the Mount Holyoke Range.

Objective 3-4: Develop and begin implementing strategies aimed at securing the long-term health of the Connecticut River and its associated habitats.

Recommended action: As a priority action item in this Plan, carefully document and map the ownership status of lands along the Connecticut River and the presence of any public access along the riverfront.

Recommended action: Work with the DEP to use compensatory storage and mitigation effectively in South Hadley Falls, in support of the Town's resource conservation and economic development goals.

Recommended action: With assistance from NHESP and volunteers, undertake a study to 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. Based on the outcome of the study, consider measures such as an overlay district to improve protection of the area and its ecological integrity.

Recommended action: Update the information from the 1987 Connecticut River Action Program urban riverfront study to reflect changing conditions in South Hadley, such as renovation of the Beachgrounds Park and the status of the Texon building.

Recommended action: Consider adopting shoreline stabilization measures into a Town policy or bylaw as one way to protect the Connecticut River shoreline.

Recommended action: Ensure that any new access points to the River protect river water quality and shoreline vegetation.

Objective 3-5: To evaluate and adjust Town policies, ordinances and bylaws to ensure these support integrated resource protection in the development review process.

Recommended action: Develop a stream setback and buffer provision based on the results of a watershed study to improve protection of brooks and protect property from flooding and erosion hazards caused by development within the riparian zone.

Recommended action: The Planning Board should conduct a follow-up on implementation of the wetland bylaw to evaluate how this bylaw is working, what issues need to be addressed, and how the bylaw's requirements are playing out in new development approvals.

Recommended action: Propose amendments to improve the effectiveness of the wetland bylaw through measures such as recommendations for native buffer plantings or fencing, or flexible standards for increased or decreased buffers based on site-specific studies.

Objective 3-6: Implement habitat protection plans in ecologically sensitive areas.

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

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

Recommended action: Direct the Conservation Commission to lead an effort to identify critical resource areas encompassing streams, ponds, vernal pools, floodplain, wetlands and other water bodies for conservation and preservation.

Recommended action: Seek funding through NHESP, DFW, and other partners to 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.

NR-4: To develop and implement a communications plan that includes a thorough, accessible and user-friendly inventory of South Hadley's natural resources and their functions and values, and which supports strong public and private conservation stewardship consistent with the goals of this Plan.

Objective 4-1: Develop a web-based, user-friendly inventory of natural resource information that is focused on directing site users to information and maps about South Hadley's many resources, both public and private.

Recommended action: Work with the Pioneer Valley Planning Commission and Massachusetts DCR and DEP to develop the desired natural resource inventory.

Objective 4-2: Understand and foster the many links between the understanding and protection of natural resources, and South Hadley’s focus on quality communications, sustainability, recreation, and a high quality visual environment.

Recommended action: Use the findings of a watershed study to promote community education and engagement through actions such as new stream and watershed signage, stream team clean-up efforts, and other events.

Recommended action: Work with partners such as the Western Massachusetts Food Processing Center to promote community-supported agriculture (CSA) and other “farm-to-table” initiatives throughout South Hadley as a way to conserve farmland and protect natural resources.

Objective 4-3: To increase sensitivity to and awareness of rare and endangered species and ecologically sensitive habitats.

Recommended action: With local schools and partners, develop an educational program about habitat and presence of the Barn Owl, Shortnose Sturgeon, and Bald Eagle within South Hadley, and how these animals relate to the Town’s natural resources and conservation efforts.

Recommended action: Consider bringing in a program such as “Keeping Track” to engage residents in understanding how wildlife moves in and through South Hadley’s natural landscapes.

Recommended action: Develop an on-line or other interactive program for residents to map wildlife and bird sightings throughout South Hadley, both to promote awareness of wildlife habitat issues and to generate planning-level information about wildlife in the Town.