CHAPTER 1

NATURAL RESOURCES AND OPEN SPACE

This chapter, Natural Resources and Open Space, addresses some of the most important assets of the Town of Shutesbury: its forests, plants and animals, meadows, streams, lake, ponds, wetlands, and groundwater. It describes past and potential future land use trends, and presents an overview of Shutesbury's landscape character and a selective inventory of the town's natural resources. The town's extensive natural and open space areas are essential elements in the social and ecological fabric of Shutesbury.

In general terms, 'natural resources' describes the biological and physical components of an ecosystem that people depend on for their existence, their quality of life, and for some, their livelihood. These components are air, geology and topography, soils, surface and ground water, vegetation, fisheries, and wildlife. Two other types of natural resources that could potentially be harnessed for local power generation include solar and wind energy. 'Open space' is defined as being land that is undeveloped, which is valued by residents because of what it provides: wildlife habitat; groundwater recharge protection; public access to recreational lands and trail systems; important plant communities; structures and landscapes that represent a community's heritage; flood control; scenery; actively managed forestland; and a source of personal and spiritual inspiration and renewal.

The quantity, quality, and spatial relationships between Shutesbury's open space and natural resources are identified. Due to the similar subject matter, aspects of the 1999-2004 Shutesbury Open Space and Recreation Plan have been incorporated into the contents of this chapter. Available information related to water quality and the value of other natural resources is presented within a watershed and sub-watershed context, since these areas provide a natural means of understanding the "lay of the land," the interplay of hills, ridges and water, and the relationships of various ecosystem components. Also, sources of pollution upstream have a direct impact on the quality of water, wildlife, and fisheries that move downstream.

In 2001, the Town of Shutesbury developed a community survey, which was distributed to landowners and residents. Nearly 16 percent of the 1,275 surveys mailed out, were returned. The results of the survey demonstrate that Shutesbury residents understand the relationship between the quality of the environment and their own lives, and the need to actively protect air and water quality, remaining fields, forestlands, wetlands and vernal pools. The survey findings were instrumental in shaping the goals and objectives for the Natural Resources and Open Space Chapter of the Master Plan. Although the community survey does not represent the opinions of every resident nor every age and income bracket, it provides the best current assessment of the issues and resources residents believe are most important and worthy of attention.

Goals:

- To maintain and protect natural resources and ecosystems including clean drinking water supplies, clean air, lake and stream water quality, large forested areas, open fields, wildlife and their habitat areas, and wetlands including vernal pools.

- To preserve the rural character by protecting large blocks of contiguous forestland, fields, and other open space from development and by promoting sustainable forestry, agricultural, and other resource-based activities.

Objectives:

- Identify and protect potential aquifers and recharge areas for public drinking water supplies and protect private well water quality.

- Monitor water quality in the rivers, streams, lakes and ponds and develop methods for their protection and improvement where appropriate.

- Develop strategies to increase funding and awareness (and establish a separate, interest bearing account for such funds) for open space protection, management, and acquisition, such as, but not limited to:

    - Land bank;

    - Continue to transfer all funds generated by Chapter 61 forest products tax to the Conservation Trust Fund;

    - Management of town-owned lands for income;

    - Payments in Lieu of Taxes from the Department of Conservation and Recreation and the Town of Amherst; and,

    - Raffles, auctions, sponsored mountain bike/ski/walkathon on trails, and /or fund drives.

- Apply identified criteria/priorities of open space acquisition/protection (i.e., the criteria listed below from the 1999-2004 Open Space and Recreation Plan) to opportunities that may arise, especially via the Chapter 61 right-of-first-refusal, so as to provide the town a rating of the parcel's relative desirability of protection.

    - Open fields and non-forested lands;

    - Important water features including falls, springs, and distinctive or unique wetlands;

    - Rare species habitat (state-listed rare, threatened and endangered) and vernal pools;

- Areas of high visual or aesthetic value;
- Recreational access and lake, stream and trail node access;
- Unique or distinctive historic, archaeological or geological features;
- Threat of development; and
- Areas that connect or enlarge protected areas and or create conservation corridors.

- As an added safeguard, establish a protocol for the potential transfer of the town's right-of-first refusal to a local conservation land trust so that high priority Chapter 61 open space, under threat of development, may be protected.

- Identify the most important scenic and recreational areas in town and seek to purchase or otherwise acquire scenic easements (legal documents that represent the transference of ownership rights between parties) from willing landowners to help protect these views from development and/or change.

- Designate Local Scenic Roads to help protect roadside trees, which contribute greatly to Shutesbury's rural character.

- Develop and adopt regulations for the town's current local wetlands protection by-law.

- Support and promote private initiatives to protect open space, natural resources, and forestland including the use of Conservation Restrictions.

- Actively pursue gifts and bequests of open space lands and Conservation Restrictions.

- Consider establishing a rural conservation overlay district, which would have conservation development design as the preferred development option.

- Adopt zoning and subdivision control measures, which will ensure that new residential development occurs at a density appropriate for a rural town.

- Coordinate the activities of the Shutesbury Conservation Commission and the Recreation Committee to plan, develop, and maintain trail linkages over land and water to enhance the recreational experiences of residents participating in the most popular outdoor activities: walking, hiking, bird watching, bicycling, X-country skiing, canoeing/kayaking/rowing, mountain biking, snow shoeing, running, and snowmobiling. In addition, resolve any use conflicts between motorized and non-motorized users.

- Proactively seek private owners of significant parcels (i.e., those who own 50 or more acres) and offer such information (previous objective); also, annually thank them for their personal contribution to rural character and outdoor recreation.

- Maintain a current open space map of protected parcels and unprotected parcels, to facilitate decision-making about acquisition or other protection actions.

- Ensure that open space lands are not taxed as developable if they do not have developable lots based on zoning.

- Promote through the use of incentives the protection, enhancement, management, and the maintenance of open fields for scenic and wildlife habitat purposes.

There are three sections included in this chapter: Landscape Character and Land Use; Natural Resources; and Open Space. Landscape Character and Land Use provides context for the rest of the chapter both by describing the town's general landscape forms and by reflecting how uses of land in town have changed over time. The Natural Resources section inventories and analyzes the town's topography, geology, and soils including a discussion of Prime farmland and forestland soils; water resources including surface water, wetlands, and aquifers; vegetation; and, wildlife, fisheries and their habitat. The Open Space section provides an inventory of public and private lands in Shutesbury that are valued for their conservation and recreation resources, and which have some level of protection as undeveloped, open space.

Landscape Character and Land Use

The Town of Shutesbury, an historic lumbering town, is a rural community located in the southeastern corner of Franklin County. Wendell borders Shutesbury on the north, the Quabbin Reservoir and New Salem on the east, Pelham and Amherst on the south and southwest and Leverett on the west. Shutesbury has a total land area of twenty-seven square miles and a landmass of 17,342 acres. Of this total land mass, 16,328 acres or 94.2 percent are undeveloped, 917 acres or 5.3 percent are developed in residential uses, and 368 acres or 2.1 percent are surface water (aerial photo interpretation of Shutesbury, 2002). Located in the northeastern portion of the Pioneer Valley region, the Town of Shutesbury is considered one of the hill towns on the eastern flank of the Connecticut River Valley. It stretches approximately six miles from north to south, and approximately six miles from east to west at the widest point.

The Quabbin Reservoir and its sub-watershed within the Chicopee River Watershed define much of the town's eastern border. This proximity to the Quabbin Reservoir and its protected watershed lands helps the town retain its rural character over time by the fact that much of the land is protected from development. In addition, the Quabbin protected lands serve as a significantly large and little-fragmented wildlife habitat area for large mammals throughout the region as well as a source of recreational opportunities including boating, fishing and hiking. Important historic and archaeological resources are also found in this area, quietly left behind when the reservoir was created and thousands of acres of land were flooded in the 1930s.

The Town of Shutesbury is rich in natural resources, primarily forests, clean water and clean air. In addition to the Quabbin Reservoir, the Atkins Reservoir and its sub-watershed, which serve the Town of Amherst, is also located in town. The high percentage of forested open space in the town functions to protect watersheds, provide wildlife habitat, and conserve the rural landscape with which Shutesbury is identified. Included in this open space are the Quabbin Reservoir lands, Shutesbury State Forest (comprised of two non-contiguous parcels), Lake Wyola State Park, several town conservation areas, and two long-distance recreation trails: the Robert Frost Trail and a section of the Metacomet-Monadnock Trail both of which traverse the southwest corner of town.

Shutesbury's overall landscape is dominated by steep, heavily forested hillsides that slope to the east, rolling wooded hills and flats to the west, and forested and non-forested wetlands within a landscape that is interspersed with occasional residential development along roadways. The exceptions to this include three areas of relatively dense residential development around Lake Wyola, January Hills, and Shutesbury Center. Shutesbury Center was assessed in the 1992 Franklin County Rural Historic Landscape Preservation Plan as being an example of a crossroad village center, which by National Park Service standards, is considered to be a significant historical community development landscape. Surface waters, such as the Sawmill River, the West Branch of the Swift River, Lake Wyola, Ames Pond, Roaring Brook, other tributary streams, brooks, ponds, and scattered wetlands have important wildlife and scenic value for residents. The drainage of the town is divided into portions of five sub-watersheds, four on the western, Connecticut River side of town, and one on the eastern, Chicopee River (Quabbin Reservoir) side of town *(see Water Resources and Wildlife Habitat Map)*. The large amount of protected state-owned lands -- more than 25 percent of total land area, located mostly on the eastern side -- provides this portion of town a measure of relief from the potential increased development pressures that will be experienced in the future.

Table 1-1: Natural Resource Related Land Use Acreages in Shutesbury, Massachusetts in 2002

Land Use	Acres	Percentage of Total Land Area in Shutesbury
Forest (and Forested Wetlands)	15,592	89.91%
Surface Water	368	2.12%
Non-Forested Wetlands	164	0.95%
Pasture	112	0.65%
Cropland	2	0.01%
Total	**16,328**	93.64%
Total Land Area in Shutesbury	**17,342**	

Source: MassGIS, Land Use Coverage, 1999 and J. Stone, 2002.

Table 1-1 lists the approximate acreage of selected natural resource related land uses in Shutesbury, according to mapping and data provided by resident and employee of the State's Executive Office of Environmental Affairs Geographic Information System (MassGIS), Janice Stone. The acreage figures are estimates based upon aerial photo interpretation.

Forestland accounts for approximately 90 percent of the total land area of Shutesbury, which includes approximately 500 acres of forested wetlands. The town also has approximately 164 acres of non-forested wetlands. Surface waters, in the form of lakes, ponds, rivers, and streams, account for approximately 368 acres or 2.1 percent of the total land area. Approximately 112 acres are identified as pasture and two acres as cropland.

Of the total land area of Shutesbury (17,342 acres), the 1,014 acres not in forest, surface waters or pasture are in land uses that constitute the built environment. This includes predominantly single-family residences and a number of two-family homes, institutional uses, the road network, and a small amount of light industrial uses.

Table 1-2 compares the amount of land in housing, forest, and other categories of land uses between 1971 and 2002. The most significant change in that thirty-one year period is the amount of forestland lost to residential development. Overall, 618 acres of forestland was lost mostly to residential uses of a half-acre or more.

Table 1-2: Changes in Land Area of Different Natural Resource and Developed Land Uses Between 1971 and 2002

	Land Use Acreages in 1971	Land Use Acreages in 1985	Land Use Acreages in 1999	Land Use Acreages in 2002	Change in Acreage from 1971 to 2002
Cropland	68	59	60	2	-66
Pasture	82	72	92	112	30
Forest*	**16,210**	**15,958**	**15,695**	**15,592**	**-618**
Non-Forested Wetland	88	103	110	164	76
Mining (Gravel, etc.)	7	3	8	6	-1
Open Land (including power lines)	111	121	157	134	23
Participation Recreation	5	5	7	12	7
Water Recreation	3	3	3	3	0
Total Residential Development**	365	572	785	898	533
Industrial	4	13	6	9	5
Urban Open***	20	34	29	26	6
Waste Disposal	5	5	5	10	5
Surface Water	365	378	371	368	3
Orchard/Nursery	9	14	14	6	-3
Total Acreage****	17,342	17,342	17,342	17,342	

*Forest includes forested wetlands, which was a category not defined in land use codes previous to 2002.
**Total Residential Development collapses three separate land use categories, which were not used in the 2002 assessment. ***Urban Open includes cemeteries, parks, public and institutional green space, and vacant undeveloped land. ****Total acreage for the 2002 assessment was 15 acres less than the other three MassGIS assessments. The 15 acres were therefore added to the total forest acreage as the forestland use type represents the greatest single land use in Shutesbury.
Source: MassGIS Land Use Coverages, 1999 and J. Stone, 2002.

According to an assessment of land use changes using Geographic Information Systems, the prevailing pattern between 1971 and 2002, was the development of individual residential lots of one-half acre or more (current minimum lot size is two acres) located along the roads and on the edge of large blocks of forested land. These frontage lots are a type of residential

development, which does not require Planning Board approval, as does the subdivision of land. Under the Subdivision Control Act, M.G.L. Chapter 41, Section 81K, land may legally be divided through an Approval-Not-Required (ANR) Plan.

Table 1-3: Town of Shutesbury New Dwelling Building Permits Issued 1996-2001

Year	Location	Number of New Dwelling Building Permits	Number of New Dwelling Building Permits Per Year
1996	Montague Road	2	
	Wendell Road	1	
	January Hills Rd	1	
	Total for 1996		**4**
1997	Locks Pond Rd.	1	
	Town Farm Rd.	1	
	Sand Hill Rd.	1	
	Total for 1997		**3**
1998	Montague Rd.	1	
	West Pelham Rd.	2	
	Old Orchard Rd.	2	
	Lake Drive	1	
	Sumner Mtn. Rd.	1	
	Cooleyville Rd.	1	
	Wendell Rd.	2	
	Leonard Rd.	1	
	Total for 1998		**11**
1999	Ames Haven Rd.	1	
	Wendell Rd.	1	
	Baker Rd.	1	
	Total for 1999		**3**
2000	Montague Rd.	1	
	West Pelham Rd.	1	
	Cooleyville Rd.	1	
	Locks Pond Rd.	1	
	Wendell Rd.	1	
	Wendell Rd.	1 Two Family	
	Total for 2000		**6**
2001	Locks Pond Rd.	1	
	Wendell Rd.	1 Two Family	
	Wendell Rd.	2	
	Pelham Rd.	1	
	Old Egypt Rd.	1	
	Total for 2001		**6**

Source: Town of Shutesbury Building Permit Files, 1996-2001.

An ANR plan may create a lot if the new lot complies with the minimum lot size and frontage requirements of the zoning. ANR endorsements can be applied for if every lot within the divided tract, at the time it is divided, has existing roadway frontage as required by the zoning bylaw. Not only must new lots meet the minimum frontage requirements, they must front on one of the three types of public ways, and must receive the Planning Board's determination that the vital access to such lots is practical access, that the way is adequate,

and that the access from the way to the buildable portion of the lot is adequate. If these conditions are met, ANR endorsement is typically given.

Table 1-3 lists by year and road the number of permits for new dwellings that were granted between 1996 and 2001. Based on this building permit information there were 33 building permits granted for new home construction in six years and two of these were for two-family homes. The roads with the greatest number of permits were Wendell Road (9), Montague Road (4), West Pelham Road (3), and Locks Pond Road (3). All but two of these permits were for ANR lots. The 1999-2004 Open Space and Recreation Plan also recognized this as the current development pattern and stressed the importance of determining which roadside natural, cultural, and recreational resources were most important to protect before ANR development compromised them.

To illustrate some of the long-term effects of development based on Shutesbury's current zoning, results of a build-out study are included here. This build-out study is part of a statewide effort funded by the Executive Office of Environmental Affairs. The methodology and results of the build-out study and associated GIS mapping are explained below.

The purpose of the build-out analysis is to determine potentially developable land areas for residential development. The process starts with identifying development that already exists based on 1999 MacConnell Land Use data. Already developed areas are subtracted from the town's total acreage and the remaining area is classified as undeveloped. Undeveloped areas are then screened for environmental constraints such as steep slopes in excess of twenty-five percent (25%), wetland areas, Rivers Protection Act buffer areas, and Zone I Recharge areas to public water supplies. In addition, protected open space is removed from consideration, but only those areas that are protected in perpetuity, such as land owned by the Department of Conservation and Recreation (Division of Water Supply Protection). Interestingly, some areas which you might expect to be screened, such as lands owned by the Town of Amherst within the Atkins Reservoir Watershed lands, may not be if a conservation restriction or some other legal mechanism is not placed on the deed to protect the land from development. Slopes between 15 and 25 percent are considered a partial constraint to certain types of land use that typically do not occur on relatively steep slopes. It is assumed that large lot residential uses could be located on the 15-25 percent slopes given a greater flexibility to grade and site structures. The areas that remain after the screening process are considered potentially developable.

The zoning district is applied to the potentially developable areas and a "build factor" is calculated. The build factor is calculated based upon the requirements of each zoning district in terms of minimum lot size, frontage, setbacks, parking required and maximum lot coverage permitted. Once calculated, the build factor is used to convert potentially developable acreage into residential house lots. Once house lots are calculated this can be translated into estimated population growth, miles of new roads, and additional water consumption and solid waste generation.

The results of the build-out analysis can be very startling. Table 1-4 describes the results of the build-out in numerical terms. According to the analysis, potentially developable land

covers approximately 8,700 acres or 50.2 percent of town, with a total approximate build-out population of 11,800. While it might take many decades to reach "build-out," it is quite clear that Shutesbury's current zoning will not protect the community's rural character or natural resource base. Although it is not possible to determine exactly when build-out might occur, this may not even be necessary. Before the last acre was developed, Shutesbury's residents, potentially nearing 12,000, may experience water shortages with a projected additional water demand of nearly 750,000 gallons per day. In addition, with 1,904 new school children at build-out, town Officials would have to build several new elementary schools. New subdivisions could result in the need for 84 miles of roads that may have to be maintained. Fire and police services would have to expand to protect the increased population.

Table 1-4: Summary Build-out Statistics of New Development and Associated Impacts

Potentially Developable Land (acres)	8,693
Total Residential Lots	3,561
Total Residential Units	3,567
Commercial/Industrial Buildable Floor Area (sq. ft.)	0
Residential Water Use (gallons per day) [2]	746,475
Commercial/Industrial Water Use (gallons per day) [2]	0
Non-Recycled Solid Waste (tons/year) [3]	3,630
Total Population at Build-out	11,763
New Residents [4]	9,953
New Students [5]	1,904
New Residential Subdivision Roads (miles)	84

Notes:

1. No development on wetlands
   No development on slopes in excess of 25%
   No development in Zone I Water Supply Protection Areas
   No development in protected open space
   No development within 150-foot buffer of transmission lines
2. Estimate from the Department of Housing & Community Development's Growth Impact Handbook
3. Statewide Average
4. 1990 Census; Population/Housing Units
5. MISER; 1997 School Children/Population

There would be highly significant ecological, economic, and quality of life impacts on the community caused by this level of population growth and development. Ecological impacts could include a reduction in the quantity and quality of wildlife habitat, a reduction in the quality of first and second order streams, lower air quality, and lower biodiversity. The economic impacts of this level of population growth and development would be felt well before maximum build-out is reached in the manner of higher property taxes. The fiscal impacts of Shutesbury's current pattern of development of single-family homes on large lots of two acres or more are discussed in greater detail in the Land Use and Zoning Chapter of the Master Plan.

Natural Resources

Shutesbury's natural resources play an important role both locally and in the region. Like Wendell and New Salem to the north and east, and Pelham to the south, Shutesbury is located at the edge of the Quabbin Reservoir Watershed, which contains the largest drinking water supply in the Commonwealth, serving 2.5 million people in forty-three towns and cities. The Quabbin Reservoir and its surrounding watershed lands are also important because they are a significant forested habitat area that is protected from development and part of a greenway that stretches from Canada to Connecticut and Rhode Island. In the western half of Shutesbury, several brooks drain lands located within the easternmost reaches of the Connecticut River Watershed. How Shutesbury manages the natural resources within its political boundaries can impact the water quality and wildlife habitat value of both the Quabbin Reservoir and Connecticut River Watersheds. For example, excessive and unplanned growth within Shutesbury could negatively impact water and wildlife habitat values in both watersheds through the spread of pollution and non-native invasive species.

In this section, Natural Resources, information is presented within a watershed context. A watershed context can provide a basis for discovering and understanding the inter-relationships of various ecosystem components and for determining the most appropriate manner by which to conserve them. Although much of what residents can do to protect what they care about in town can occur within existing town boards and committees, or at Town Meeting, some of the means for protecting these resources may involve looking beyond Shutesbury's political boundaries. Streams flow across town boundaries and are shared community resources. Groundwater and wildlife move below and above ground and are affected by how people use the land no matter which town they are from. The sub-sections of the Natural Resources section include Geology, Topography, and Soils; Water Resources; Vegetation; and Wildlife and Fisheries.

Geology, Topography, and Soils

The land's general morphology today and the manner in which its main land form features affect soils, vegetation, and the community's use of the land. The region's geological history over the past 700 million years shaped Shutesbury's land formations.

The bedrock formations in the Town of Shutesbury are part of the Pelham Dome. The rock units are part of the Bronson Hill Anticlinorium, with the Connecticut River Valley Border Fault to the west and the Amherst Inliers to the southwest. The bedrock is predominantly Dry Hill Gneiss (Proterozoic Z) around Lake Wyola and Four Mile Gneiss (Ordovician, Cambrian, Proterozoic Z) to the east along the Quabbin Reservoir.

Shutesbury's topography could be described as a north-south running ridgeline or hill that slopes gently both north to Lake Wyola and south to Pelham. The manner in which the land slopes west from this north-south running hill is significantly different from the eastern slope to the Quabbin Reservoir (*see Topography Map*). The western half of Shutesbury, along the

boundary between the Connecticut and Chicopee River Watersheds, comprises four distinct upland areas draining into streams, which ultimately reach the Connecticut River. These four sub-watersheds are:

1) Lake Wyola/Sawmill River - Ames Pond (13 acres) and Lake Wyola (129 acres) in the north empty into the Sawmill River;
2) Dudleyville marsh/Sawmill River - Further south of Morse Hill, the Dudleyville marsh drains the eastern slopes of Brushy Mountain into another tributary of the Sawmill River;
3) Roaring Brook - In the central part of town an extensive wetland system, north of Leverett Road, flows into Roaring Brook; and,
4) Adams Brook - In the southwestern corner of town, upland slopes drain into many tributaries of Dean Brook, which empties into Adams Brook; Nurse Brook, an Outstanding Resource Water, empties into Atkins Reservoir, which also feeds Adams Brook

The fifth sub-watershed, the Quabbin Reservoir, is the largest sub-watershed, located in the eastern half of Shutesbury, within the larger in the Chicopee River Watershed. Steep slopes and the drainages of five fast-running brooks that flow south and southeast into the West Branch of the Swift River and the Quabbin Reservoir characterize this sub-watershed. The elevation drops 500 feet to the Quabbin Reservoir in this area, which contains the West Branch of the Swift River, Cobb Brook, Atherton Brook, Camel Brook, and Rocky Run. The eastern–most parcel of the 729-acre Shutesbury State Forest is also located in this area. The northeastern quadrant of Shutesbury is dominated by two north-south running ridgelines between Macedonia and New Boston Roads *(see Water Resources and Wildlife Habitat Map)*.

Elevations in Shutesbury vary from 350 feet above sea level in the southwest corner of town near Atkins Reservoir to over 1,000 feet in the adjacent January Hills. The town center, at 1,225 feet, is situated at the top of the long, broad, north-south ridge. The highest point in town is 1,305 feet above sea level, north of Shutesbury Center along Wendell Road.

The Town of Shutesbury has approximately 670 acres (4 percent) of its soils classified as Prime farmland soils. Prime farmland soils locations were based on Franklin County soil maps developed by the Soil Conservation Service (now the Natural Resource Conservation Service) in 1967. Prime farmland soils classification is determined by such factors as precipitation, temperature, growing season, acidity, alkalinity, and stoniness. These soils, generally Merrimac, Sudbury, and Scituate types, are mostly scattered on small parcels, except for a large block east of New Boston Road and the West Branch of the Swift River. An additional 3,474 acres (20 percent) is considered farmland soil of state and local importance. This classification is determined by the same factors as the Prime soils, but fail to meet one or more of the requirements (often slope or stoniness). Large blocks of these soil types (Essex, Gloucester, Scituate, and Hinkley), described as shallow and deep well-drained soil in sandy glacial till, are distributed throughout town. Almost all of the farmland soils are presently forested. Many are sandy, stony, and/or sloping, and are better suited for orchards, vineyards, hay, or pasture than high yield cropland.

All but 143 acres (0.8 percent) are classified by the National Resource Conservation Service (NRCS) as soils having severe limitations for building. However, revisions to Title 5 have made it possible to construct septic systems using new technologies and construction methods. As a result, septic system regulations can no longer be considered to limit residential development.

Prime Forestland Soils

While agricultural land is in short supply in Shutesbury, the town has approximately 15,592 acres of forest, approximately 90 percent of the total land area. One method for describing the large forest acreage in Shutesbury is based on the productive capacity of the forest, which can be estimated by using the Massachusetts Prime Forest Classification System. A second method for describing the relative value of forestland compares the sizes of interior forest habitat area of large forest blocks. This second method is described on page 32.

Town officials might consider Prime forestland soils as a criterion for assessing the relative value of land protection opportunities. In addition, if the town were to establish a Municipal Forest for the purpose of growing timber as a source of revenue, soils would likely be one of the selection criteria. Finally, because forests are so important to residents, the soils that support tree growth best might be considered to be important enough to conserve through zoning (reduce density of development) and non-zoning means (encouragement of private land protection and forest management).

The U.S. Department of Agriculture (USDA) has a policy to locate Prime forestland soils and protect them from conversion to non-agricultural uses. USDA funded a project by the Department of Forestry and Wildlife Management (now Department of Natural Resources Conservation) of the University of Massachusetts to define, classify, and map the Prime forestlands in the State.

Table 1-5: Town of Shutesbury Acreage Assessment by Prime Forestland Soils Class

Class	Prime I Soils	Prime II Soils	Prime III Soils	Prime I, II, and III Soils
Acres of Forest in each Prime Soils Class	690 acres	3,412 acres	8,250 acres	12,352 acres
Percent of Total Shutesbury Land Area in Each Prime Soils Class	4.0 %	19.9 %	47.9 %	71.8 %
Percent of Total Shutesbury Forest Area in Each Prime Soils Class	4.3 %	21.2 %	51.4 %	76.9 %

Source: Research Bulletin Number 705/October 1985, Prime Forest Land Classification for Forest Productivity in Massachusetts, Massachusetts Agricultural Experiment Station, University of Mass. Amherst, 1985.

The Prime forestlands system has nine categories of soils based on productivity and wetness. Prime I, II and III, Prime III wet, Statewide Importance and Statewide Importance wet, Local Importance and Local Importance wet, and Unique. Prime forestland soils support a production of white pine wood fiber at a rate greater than eighty-five cubic feet per acre per year, and northern red oak wood fiber at a rate greater than forty cubic feet per acre per year.

As a point of comparison, the U.S. Forest Service defines forestland as vegetated cover with a growth of wood fiber at a minimum rate of twenty cubic feet per acre per year. The forestland with Prime I, II, and III soils would be the most important to conserve for commercial forest management. Soils of statewide and local importance still have the potential for producing wood products but the financial return may not be as high.

Many of the soils in Shutesbury belong to soil associations that are found in depressions or sloping locations and are comprised of sand or sandy loams. Many of these soils are classified as Prime I, II, and III forestland soils. By comparing these categories to the soil survey field maps for the Town of Shutesbury, one can identify the areas in town that contain Prime forestland soils. In general Prime I and II forestland soils are found mostly in the Connecticut River Watershed to the west of Wendell Road, while Prime III soils are in the Chicopee River Watershed to the east. Since the amount of land containing Prime I, II, and III forestland soils is equal to 12,352 acres, or 72 percent of the total land area in town and 77 percent of all forest (*see Table 1-5*), a more focused inventory of Prime I and II soils is included below.

Prime I forestlands soils are comprised mainly of the Ridgebury series, which is characterized as seasonally wet, poorly drained fine sandy loam found in depressions and gently sloping upland areas. This soil is found in three main locations in Shutesbury:

1. The largest grouping of these Prime I forestland soils is located in upland areas surrounding the wetlands that drain into Roaring Brook. This area is found north of Leverett Road, west of Wendell Road, and east of Montague Road;
2. The second smaller area occurs just south of Morse Hill and east of the Dudleyville marsh, which drains into a tributary of the Sawmill River; and,
3. The third area is located south of Leverett Road and comprises the land draining into the tributaries of Dean Brook, which enters Atkins Reservoir, and five other smaller areas of Prime I soils located adjacent to West Pelham and Pelham Hill Roads.

Prime II forestland soils in Shutesbury are comprised mainly of the Gloucester series, which is characterized as well drained slightly droughty fine sandy loam generally found in nearly level to very steep uplands. The Sudbury and Merrimac series are also Prime II forestland soils but occur in Shutesbury to a lesser extent. The Sudbury series is characterized by moderately well drained fine sandy loam formed in deep sandy and gravelly deposits, which can be found in level to gently sloping glacial outwash and stream terraces. The Merrimac series is characterized by well-drained, slightly droughty, fine sandy loams. The Merrimac series can also include sandy loams on nearly level to steep kames, eskers and glacial outwash terraces. The largest areas of Prime II forestland soils are located:

1. Between the town line with Leverett and Montague Road;
2. In an area that straddles the intersection of Locks Pond and Wendell Roads;
3. On the slopes of January Hills;
4. East of Pratt Corner Road, and;
5. In the southwestern corner of town along the northern slopes of Poverty Mountain.

Water Resources

The conservation of Shutesbury's lakes and streams was considered to be *very important* by 84 percent of the people who responded to the 2001 Master Plan Survey. The protection of clean drinking water was also considered to be *very important*. It is important that streams, wetlands, and lakes be free from pollution because all residents rely on private wells that draw from groundwater. Groundwater recharges wetlands and streams and vice versa. If surface waters can be kept free of pollutants than private wells will be less likely to become contaminated.

Watersheds and Surface Waters

The Town of Shutesbury is rich in water resources that include a variety of brooks, streams, ponds, wetlands, and aquifers *(see the Water Resources and Wildlife Habitat Map)*. As described above, land within the Town of Shutesbury drains into two main watersheds: the Connecticut River and the Chicopee River Watersheds. Within the Connecticut River Watershed, the four sub-watersheds are the Adams Brook sub-watershed, the two Sawmill River sub-watersheds, and the Roaring Brook sub-watershed. The Quabbin Reservoir sub-watershed is located within the Chicopee River Basin.

Connecticut River Watershed

The western half of Shutesbury lies in the Connecticut River Watershed, the largest river ecosystem in New England. The Connecticut River Watershed contains other sub-watersheds that are often viewed as major watersheds including the Chicopee, Millers, and Deerfield River Watersheds. It encompasses approximately 11,000 square miles and travels from its headwaters at Fourth Connecticut Lake at the Canadian border through Vermont, New Hampshire, Massachusetts, and Connecticut. The river enters Massachusetts through the Town of Northfield and drains all or part of forty-five (45) municipalities before entering the State of Connecticut where it eventually empties into Long Island Sound at Old Saybrook. The entire Connecticut River Watershed is 80 percent forested, 12 percent agricultural, 3 percent developed, and 5 percent wetlands and water.

Adams Brook Sub-watershed

The Adams Brook Sub-watershed is located within the portion of Shutesbury that is south of Leverett Road and west of Pelham Hill Road. It covers approximately 3,721 acres or 21 percent of the town. The three main brooks in this watershed are Dean Brook, Adams Brook, and Nurse Brook. There are also two main surface waters: Atkins Reservoir and Bakers Reservoir.

Dean Brook, Adams Brook and Nurse Brook

Dean Brook, Adams Brook and Nurse Brook are located in the southwestern part of Shutesbury. Dean Brook and Nurse Brook flow for a brief time along Sand Hill Road and Pratt Corner Road. Nurse Brook flows into Atkins Reservoir and Dean Brook empties into Adams Brook southeast of Atkins Reservoir, which flows south across the town's shared boundary with Pelham, along the base of the western slopes of Poverty Mountain. The Amherst Water Department sometimes diverts the water from Dean Brook into the Atkins Reservoir. Many forested and non-forested wetlands can be found at the headwaters of each brook and the NHESP considers an upper stretch of Dean Brook to be an Estimated Habitat of Rare Wildlife. A low to medium yield aquifer is also associated with this brook. According to the Natural Resources Program (1974), Dean Brook has one of the most scenic cascades and gorge landscapes in the area, on land owned by the Town of Amherst.

Atkins Reservoir

The Atkins Reservoir, developed in the 1930s, serves the Town of Amherst. It lies in the southwestern corner of Shutesbury along Market Hill Road. The reservoir has a watershed of approximately six (5.7) square miles, which is primarily forested with sparse large-lot residential development. The Reservoir's sub-watershed and that of Nurse Book, are both classified as Outstanding Resource Waters under the Massachusetts Surface Water Quality Standards of 1995. These waters constitute a significant resource as determined by their outstanding socioeconomic, recreational, ecological and/or aesthetic values. The reservoir has a water surface of fifty-one (51) acres and a storage capacity of 200 million gallons. It has an estimated safe yield of 1.2 million gallons. It is off limits to any recreational use, but provides a scenic view from January Hills Road. A large area surrounding the reservoir is considered by the NHESP of the Massachusetts Division of Fisheries and Wildlife (DFW) to contain Estimated Habitats of Rare Wildlife.

Baker Reservoir

Baker Reservoir is a man-made pond located on the south side of Baker Road about two (2) acres in size, with a fifteen (15) acre wetland containing some unusual wetland plants along its south shore. The land surrounding the reservoir and wetland used to be in the Chapter 61B program, but was removed from the program during the past five years. Just to the west across West Pelham Road, the Town of Amherst owns a large contiguous block of forestland, which contains the tributary that drains the reservoir.

Sawmill River Sub-watersheds

Portions of two Sawmill River sub-watersheds are located in the northwestern portion of town, and cover approximately 2,655 acres or 15 percent of Shutesbury. The Lake Wyola/Sawmill River Sub-watershed drains land as far north as Montague Road in the

neighboring town of Wendell. The watershed in Wendell includes Fiske Pond, Fiske Brook, and Plympton Brook, all of which drain into Lake Wyola. To the south and east of Lake Wyola, Ames Pond and South Brook drain the slopes of Ames Hill and Mount Mineral to the east and southeast, the eastern slopes of Morse Hill to the west, and at the southern extremes of its basin, the northern slopes of the town's highest hill at 1,305 ft.

The Dudleyville Marsh/Sawmill River sub-watershed drains approximately thirty-two (32) square miles of land located in the towns of Shutesbury, Wendell, Leverett and Montague. From its origin at the Lake Wyola dam in Shutesbury, the Sawmill River flows westerly for approximately fourteen (14) miles to its confluence with the Connecticut River in the Town of Montague.

Eighty-five (85) percent of the watershed area is primarily forested and is located upstream from State Route 63 in Montague. The topography and stream gradients of this portion are fairly steep. The valleys are narrow with limited floodplains. In general, housing density in this section is low with most homes located adjacent to roads. The exception to this is the dense housing surrounding Lake Wyola and the headwaters of the Sawmill River, with most lots of less than a ¼ acre in size. Downstream from State Route 63 the watershed characteristics change. The land use is a mixture of cropland, pasture, forest and other open land. The topography flattens and the valley (floodplain) widens. Development is generally light with the exception of the Village of Montague Center.

According to the Sawmill River Watershed Assessment conducted by the Natural Resource Conservation Service (NRCS) (March, 2002), the most significant environmental issue in the watershed is the erosion of the streambanks with subsequent sedimentation, resulting in habitat destruction, flooding and bridge/roadway maintenance problems. These environmental concerns have been caused by human manipulation of the river since colonial times. The forms of manipulation include damming of the river for waterpower; dredging of the river in an attempt to provide more capacity for floodwater; the construction of bridges across the river with bridge abutments located in the active floodplain, thereby causing restriction or deflection of the natural streamflow; the placement of riprap along both North Leverett Road and Sunderland Road causing an increase in stream velocity and deflection of flows to more erodible sand and gravel deposits; and to a lesser extent the farming practice of allowing cows access to the river causing erosion due to hoof traffic.

Also of concern is the degradation of fisheries habitat along the river. Sedimentation can negatively impact the spawning habitat in the streambed. The erosion along the streambanks removes overhanging vegetative cover and increases water temperature, which also affects the habitat. In addition, dredging of the sediment, has resulted in widening of the stream channel, reducing the depth of the streambed, thereby increasing water temperature.

The riparian corridor is also being transformed through direct and indirect human actions. The typical land cover along riparian corridor is composed of mature trees. However, there are stream segments along the Sawmill River where this forested buffer has been replaced by impervious surfaces, riprap, or mowed grass. Invasive species are also present and in some

places have successfully taken over the understory. As a result, overall plant diversity declines, negatively impacting wildlife habitat.

In summary, protecting the quality of the riparian corridor and the land uses in the upper reaches of the Sawmill River in Shutesbury will likely help to reduce some of the problems occurring further downstream. If development were to gain a greater foothold surrounding the tributaries to Sawmill River, or if invasive species were to become even more prevalent, it is likely that these changing conditions within the river ecosystem would continue to negatively impact plant and animal species.

Lake Wyola

Lake Wyola, located in the northwestern corner of Shutesbury, is approximately 129 acres in size. It is intensively used for fishing, swimming, and boating. More than three quarters of the shoreline is developed with year-round homes and summer cottages. At the north end of the lake is the Carroll Holmes Recreation Area, a major DCR facility that attracts hundreds of bathers daily at the peak of the swimming season. At the south end of the lake there is a public boat launch ramp.

At the southern end of the lake, both forested and non-forested wetlands are fed by the Ames Brook and South Brook sub-basins, which also contain an extensive low- to medium-yield aquifer. This aquifer extends south to a small wetland system east of Wendell Road and east to Ames Pond and includes a tributary of the West Branch of the Swift River. Approximately 80 percent of the water enters Lake Wyola via Fiske Brook, on the east side of the lake; the Fiske Brook watershed is located in Wendell.

The present shoreline of Lake Wyola was established by the construction, around 1900, of a dam that approximately doubled the surface of the original great pond, known as Locks Pond. The surface elevation of the lake is controlled by this dam; its outflow feeds the Sawmill River, which originates at this point. In addition to water flowing over the dam, a manually operated gate built into the dam permits the further release of water to the river. In June 1998, the DEM (now DCR) Office of Dam Safety inspected the dam and ordered some repairs and a safety assessment of the dam; the repairs were accomplished during the lake drawdown in September 1998, but the safety assessment has yet to be undertaken for lack of funds. In light of recent legislation (2002) that makes owners of dams responsible for their inspection and maintenance and liable for damage caused by their failure, such an assessment has become both imperative and urgent

Lake Wyola is a valuable resource for recreational fishing. A good warm water fishery, it was found by a 1978 Mass Wildlife survey to provide habitat for nine species of fish. In 1999, the NHESP of the Massachusetts Division of Fisheries and Wildlife designated Lake Wyola as an area that contains rare wetlands wildlife and as a priority habitat area that includes unique habitat features. The impact of this designation is significant: any plan for construction in the lake area that involves the alteration of the lake itself or the filling of wetlands must be submitted to Natural Heritage as well as to the Shutesbury Conservation

Commission, which is the local administrator of Natural Heritage, to be reviewed for possible adverse effects on the rare species.

Presently, Lake Wyola's water quality is good, according to local water quality testing that has been conducted over the past ten years. Testing results indicated that Lake Wyola could be classified as mesotrophic. Measurements show low levels of nitrogen, phosphorus, and algae. Algae growth is monitored via water transparency and chlorophyll concentration.

Invasive vegetation has not yet been carried to Lake Wyola. Aquatic vegetation is monitored regularly via samples taken by scuba divers and by underwater video mapping. The Lake Wyola Advisory Committee works to prevent the introduction of invasive species by educating boat owners and by providing cleaning equipment and instruction at the boat launch ramp.

A *Management Plan for Lake Wyola* was prepared in 1997 by New England Environmental, Inc., of Amherst, under a grant from the Massachusetts Department of Environmental Management. This plan recommends lake drawdown every seven years for vegetation control and repair of shoreline structures. The plan also includes recommendations for the control of erosion and runoff leading to sediment deposition, with emphasis on the proper maintenance of both paved and unpaved roads.

An extensive study of the total phosphorous distribution in Lake Wyola and its watershed, funded by the Massachusetts Watershed Initiative (2000-2001) found total phosphorous levels to be low. In November, 2002, Lake Wyola was removed from the DEP's 303(d) list of impaired waters. In 2003,the Department of Environmental Management, together with the Town of Shutesbury, the Lake Wyola Advisory Committee, and the Lake Wyola State Park/Ruggles Pond Advisory Board, applied for an was awarded a "319 Non-point Source Pollution Grant" to protect Lake Wyola and its watershed, with emphasis on erosion control and drainage improvement, public education, and a septic management program. Tasks will include a detailed survey of non-point source pollution in the watershed.

Ames Pond

Ames Pond is approximately thirteen (13) acres in size, and includes a two (2) acre natural bog. Ames Pond is a man-made water body with a stone dam. Abundant wildlife use the pond as a source of water, food, and shelter. A large acidic bog is located northeast of the pond and is home to plants typical of sphagnum bogs. The landowner of the pond has maintained a boardwalk across the pond's edges and has allowed the public to use the trails around the bog. Currently the pond is surrounded by land protected with a conservation restriction *(see Open Space section and Open Space Map).* In 2003, the Department of Conservation and Recreation acquired development rights to some 140 acres of this property; there is limited public access.

Roaring Brook Sub-watershed

The Roaring Brook sub-watershed drains lands in the west central portion of Shutesbury and covers approximately 2,914 acres or 17 percent of the town. The Roaring Brook flows from Shutesbury into the Town of Leverett along Leverett Road. In Shutesbury, Roaring Brook is located north of Leverett Road with its main tributaries located in the western central area of town between Montague Road and Wendell Road. This watershed contains five vernal pools, forested and non-forested vegetative wetlands, and estimated habitats of rare wildlife (*see Water Resources and Wildlife Habitat Map*). Roaring Brook has historically been used by small mills for its waterpower as evidenced by the remains of dams in Leverett. The Massachusetts Department of Fisheries and Wildlife (DFW) stocks the brook annually with trout. An extensive low to medium yield aquifer straddles the brook and may be associated with the source of the Shutesbury Elementary School's public water supply well.

Chicopee River Watershed

The eastern half (45%) of the Town of Shutesbury is located in the Quabbin Reservoir sub-watershed within the larger Chicopee River Watershed. Of the 7,862 acres within the Quabbin Reservoir sub-watershed, 5,098 or 65 percent is owned by the Department of Conservation and Recreation (Division of Water Supply Protection). The Chicopee River Watershed is comprised of three major river systems, the Swift River, Ware River and Quabog River. All merge to form the mainstem Chicopee River in the village of Three Rivers. The Chicopee River Watershed represents the largest of the twenty-seven (27) major drainage basins in the Commonwealth of Massachusetts and is also the largest tributary to the entire Connecticut River. The watershed includes all or part of thirty-nine (39) cities and towns. It has a drainage area of approximately 720 square miles and encompasses approximately 135 rivers, 842 miles of brooks and streams, and 170 lakes, ponds and reservoirs, which collectively cover more than forty-eight (48) square miles across the watershed.

The watershed priorities for the Chicopee River Watershed as outlined by the Massachusetts Executive Office of Environmental Affairs include: Stormwater impacts and implementation of Phase II regulations; Open space protection; Combined Sewer Overflow mitigation; Lake and Pond issues; Capacity-building, especially of NGO's and municipalities; Outreach and Education; and, Water supply protection (both existing and future supplies).

The Quabbin Reservoir Watershed has been designated by the Massachusetts Audubon Society (MAS) as an Important Bird Area (IBA). The IBA encompasses 120,000 acres and includes the Reservoir itself. According to MAS there are three state-listed species that breed at the Quabbin Reservoir Watershed IBA. They are the Common Loon, Bald Eagle and Pied-billed Grebe. Due to the large amount of contiguous forest, the watershed supports significant breeding populations of forest-associated songbirds, including thirty-five (35) high conservation priority species (Mass. Audubon Website; 2002).

The Quabbin Reservoir Watershed offers a number of recreational opportunities with 3,500 acres available for public use. The area offers hiking, picnicking and nature study. In the northern end of the reservoir itself, fishing, boating, and hunting are permitted.

In 1991, the Division of Watershed Management and the Massachusetts Water Resources Authority (MWRA) developed the Watershed Protection Plan for the Quabbin Reservoir/Ware River Watersheds as the first written plan for management of the watershed. A Plan Update was developed in 2000, which provides a framework for prioritizing and implementing the complement of watershed protection activities through the definition of water quality goals, watershed protection goals and defined geographic protection zones.

Table 1-6: Summary Table of Testing Results for the Quabbin Reservoir Watershed– Shutesbury, Massachusetts Segments

Location	**Aquatic Life**	**Fish Consumption**	**Primary Contact** (e.g. Swimming)	**Secondary Contact** (e.g. Boating)	**Overall Ranking of Segment**
Atherton Brook Headwaters at confluence of Town Farm and Osgood Brooks, Shutesbury to mouth at Quabbin Reservoir in Pelham (1.9 mi.)	**Support** ***Although pH is low, it is considered to be naturally occurring. Dissolved oxygen and temperature measures indicated high water quality.***	**Not Assessed**	**Support**	**Support**	**Class A** *These waters are designated as a source of public water supply*
West Branch Swift River at Headwaters outlet of small unnamed impoundment east of Cooleyville Rd. in Wendell State Forest, Wendell to mouth at Quabbin Reservoir, Shutesbury/New Salem (6.3 mi.)	**Support**	**Not Assessed**	**Support**	**Support**	**Class A** *These waters are designated as a source of public water supply.*

Source: MA Department of Environmental Protection, "Chicopee River Basin, 1998 Water Quality Assessment Report" 1998.

The Watershed Protection Act (WPA) was passed in 1992. This act provides protection to the watersheds of the Quabbin Reservoir, Ware River, and Wachusett Reservoir (M.G.L. Chapter 36 of the Acts of 1992). The WPA and its regulations address land uses and activities in two critical areas. First, within 400 horizontal feet of the reservoirs and 200 horizontal feet of the tributaries and surface waters (Primary Protection Zone), any alteration is prohibited. Secondly, between 200 and 400 horizontal feet of tributaries and surface waters and on certain other lands (Secondary Protection Zone), specific activities are prohibited and all development proposals are evaluated. Through the WPA, the Department of Conservation and Recreation (Division of Water Supply Protection)(DCR/DWSP) regulates 11,011 acres in the Quabbin Reservoir Watershed. Additionally, the DCR/DWSP works with state agencies and local communities to ensure the full utilization of state and local environmental regulations.

The Swift River Sub-watershed totals 45.1 river miles along eight (8) rivers and includes Atherton Brook, Cobb Brook, Camel Brook, and the West Branch of the Swift River, which flow through the Town of Shutesbury, and are tributaries to the 187 square mile Quabbin Reservoir.

West Branch of the Swift River

The West Branch of the Swift River lies in the eastern half of the Town of Shutesbury in the Quabbin Reservoir Watershed. The West Branch of the Swift River is classified as a Class A water body, a source of public water supply (*see Table 1-6*). The headwaters for this River are located in the Town of Wendell to the north. Numerous forested wetlands can be found along its length. The West Branch is stocked with trout but also contains a native brook trout population, which is a sign of high quality water. The West Branch is a popular fly-fishing spot, and also contains landlocked salmon migrating up from the Quabbin Reservoir in the fall. In addition, a low to medium yield aquifer straddles the river from the edge of the reservoir, north to a point on the river due east of the intersection of Locks Pond and Wendell Roads (*see Water Resources and Wildlife Habitat Map*). The NHESP considers the southern most mile of the river to be both Estimated Habitats of Rare Wildlife and Estimated Priority Habitats of Rare Species.

Atherton Brook

Atherton Brook is located in the southeastern corner of the Town of Shutesbury and is also classified as a Class A water body. It crosses the border into the Town of Pelham where it converges with the Quabbin Reservoir. The brook's southern most one and a half miles is considered by the NHESP to be Estimated Habitats of Rare Wildlife. An old bog is located west of Pelham Hill Brook at the headwaters of Atherton Brook, which is also considered to contain Estimated Habitats of Rare Wildlife. Osgood and Town Farm Brooks are tributaries of Atherton Brook that drain forested wetlands located southwest of Shutesbury Center.

Rocky Run, Camel Brook, and Cobb Brook

Rocky Run, Camel Brook, and Cobb Brook are tributaries of the West Branch of the Swift River (and the Quabbin Reservoir) that drain the lands east of Wendell Road and Shutesbury Center. Significant portions of these brooks are located on land owned by the Department of Conservation and Recreation (Division of Water Supply Protection)(DCR/DWSP), which is considered to be protected from development and as such, is characterized as having a lower priority for water quality monitoring by the DCR/DWSP (Lyons, DCR/DWSP, personal communication; 2002).

Vernal Pools

The Commonwealth's Natural Heritage & Endangered Species Program (NHESP) describes vernal pools as unique wetlands that support diverse and valuable wildlife communities, including many state-listed rare species. Vernal pools vary in size and physical characteristics, but all are characterized by springtime ponding, a lack of reproducing fish populations, and the wildlife communities that are adapted to these conditions. They are all important to the long-term preservation of biodiversity.

According to the 1999-2004 Shutesbury Open Space and Recreation Plan, there are approximately twenty (20) known vernal pools in the Town of Shutesbury, not including those found in the Quabbin Reservoir Watershed. Twelve (12) have been certified by the Natural Heritage Program (NHESP; 1999). To educate the public and provide more information about potential vernal pool locations throughout the state, in 2001 the NHESP published the *Massachusetts Aerial Photo Survey of Potential Vernal Pools*. Based upon interpretation of aerial photos, thirty-four (34) potential vernal pools in Shutesbury have been identified by the NHESP. Certified vernal pools are different than potential vernal pools in that they have been field checked and documented by the NHESP, and are provided with regulatory protection through the Massachusetts Wetlands Protection Act Regulations. Potential vernal pools have not been certified, and require field verification to determine whether they qualify for protection under the Wetlands Regulations.

Wetlands

Many wetland types, including forested and non-forested wetlands, exist along Shutesbury's rivers, streams and ponds, as well as in upland areas. Wetland areas are often high in biological diversity and are nature's way of ensuring good water quality. Both wetlands and floodplains perform crucial environmental functions such as flood storage and control, and pollution filtration. Supporting approximately 43 percent of the nation's rare and endangered species, wetlands are home to an abundance of wildlife. They are also commonly recharge zones for groundwater sources. For all of these reasons, it is important that Shutesbury identify and protect its wetlands and floodplains.

The majority of wetlands in the Town of Shutesbury are forested, commonly evergreen or evergreen/deciduous mix. The most dominant evergreen of these wetlands is eastern hemlock, with some wetlands also containing white pine, or occasionally larch or black spruce. Deciduous forested wetlands are predominately red maple swamps, many resulting from previous beaver activity. Shrub wetlands occur especially around the edges of water bodies, and include deciduous shrubs such as red maple, winterberry, blueberry, and viburnums, but also myrica gale, and leatherleaf in the bogs.

Shutesbury's major wetland resources include: a two (2) acre natural bog adjacent to Ames Pond; a fifteen (15) acre wetland adjacent to Baker Reservoir containing some unusual wetland plants along its south shore; and the Dudleyville marsh. The Dudleyville marsh off the eastern and western sides of Montague Road used to be ponds that were drained several

years ago (per order of the Massachusetts Department of Dam Safety) and have become the only large expanses of marsh in the Town of Shutesbury, with the exception of the Quabbin Reservoir Watershed. The ponds are now nine (9) acres of shallow and deep marsh, with a natural spring and sphagnum bog on the western side. The owner has a permit to rebuild the dam and re-flood the area. There are numerous other wetlands in the Town of Shutesbury.

Wetland protection in Shutesbury takes many forms. The Conservation Commission helps to protect town wetlands through their inspection of notices of intent. The Department of Conservation and Recreation (Division of Water Supply Protection) and the Town of Amherst both purchased a significant percentage of their watershed lands. In addition, the acquisition of the South Brook Conservation Area was in part to protect watershed lands. There have also been recent efforts to adopt a watershed protection overlay district by the Planning Board.

The provisions of the Federal Clean Water Act, the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, Section 40, February 14, 1997), and the Massachusetts Rivers Protection Act, as amended in 1996, provide some protection to wetlands. The Clean Water Act prohibits virtually any ground-disturbing activities within 100 feet of all wetlands unless approved through special permit. However, historic enforcement of the law does not meet the stated policy of "no net loss" of wetlands acreage, nor are there adequate systems for tracking the losses annually, according to a report by the National Academy of Sciences. In 1997, the United States Fish and Wildlife Service estimated that the nation was losing 58,500 acres of wetlands to development or agriculture annually. According to the National Audubon Society, wetlands losses are closer to 100,000 acres a year.

The Massachusetts Wetlands Protection Act prohibits removal, dredging, or alterations of any river or stream bank, freshwater or coastal wetlands, beach, dunes, flat, marsh, meadow or swamp bordering on any resource area as defined in the Act without a permit from the Commission to perform the work. The jurisdiction of the Commission includes the 100-foot buffer zone located from the edge of these resource areas. Its intent is to ensure the protection of public and private drinking water and groundwater supplies, land containing shellfish, wildlife habitat, and fisheries, to control flooding, and to prevent storm damage and pollution.

The Rivers Protection Act, Chapter 258 of the Acts of 1996, creates a 200-foot riverfront corridor on each side of a perennial river or stream, measured from the mean annual high-water line of the river, to protect the natural integrity of rivers and to encourage and establish open space along river. The riverfront areas protect water quality, stabilize stream banks, reduce flood peaks and downstream flooding, support fish and wildlife habitat, and protect groundwater. Riverfront areas may contain wetlands and floodplains, but intermittent streams are not subject to the Rivers Protection Act. According to area estimates using 100- and 200-foot buffers of perennial rivers and brooks in Shutesbury, as found in the MassGIS hydrography coverage, there are approximately 890 acres of land within the first 100 feet of the riverfront area and 861 acres within the second 100 feet.

The law builds on the strength of the existing permitting procedures under the Wetlands Protection Act. The Shutesbury Conservation Commission or the State Department of

Environmental Protection (DEP) reviews projects located within the riverfront area. Work in the riverfront area is not prohibited, but applicants must demonstrate that their projects have no practicable alternatives and will have no significant adverse impacts. Existing structures such as single-family homes and accessory uses are exempt from the Rivers Protection Act.

Aquifers and Drinking Water Supplies

Aquifers are important water resources that exist underground. When it rains heavily, a large percentage of water infiltrates the soil, slowly migrating down to the saturated zone. The area between the saturated zone and the unsaturated zone is known as the water table of the aquifer. When more rain enters the aquifer than is taken out, the water table rises. The US Geological Survey (USGS) and the Office of Massachusetts Geographic Information Systems (MassGIS) have mapped subsurface conditions that support low to medium yield aquifers *(see the Water Resources and Wildlife Habitat Map)*. According to the USGS and MassGIS there are low-to medium yield aquifers located in the vicinity of the following water bodies:

- Lake Wyola and Ames Pond;
- Dudleyville marsh;
- West Branch of the Swift River;
- Roaring Brook; and,
- Dean Brook.

Low to moderate yield aquifers could provide enough water for a small community supply. It is estimated by DEP that low to medium yield aquifers can produce 0-50 gallons per minute (gpm), while high yield aquifers tend to produce in the 50-200 gpm range. A well rated at 50 gpm, would produce 72,000 gallons per day. Based on an average per person consumption figure of 75 gallons, used by the Massachusetts Executive Office of Environmental Affairs (EOEA) Community Preservation Initiative, an aquifer of this yield could serve 960 people. Aquifers and potential community water supplies will be discussed further in the Master Plan Chapter, Community Facilities and Services.

It is imperative that the Town of Shutesbury takes watersheds into consideration when considering the quality and quantity of drinking water that may be available to it. The fact that an aquifer is physically located within the town does not automatically guarantee that its water resources are available for use as drinking water by town residents: the water may be part of a watershed that is already allocated to other users (such as the Town of Amherst) or other uses (such as stream flow). Under the Water Management Act (Chapter 592, Acts of 1985), the Water Resources Commission has jurisdiction over the allocation of water within a watershed. The Commission must consider impacts on stream flows in the watershed and other riparian users when ruling on any proposed water withdrawal.

Currently there are no public wells or water distribution systems in Shutesbury, except for the elementary school, Lake Wyola State Park, and one associated with the Fire Station that has been connected to several homes. All other households rely on private wells. Therefore

the protection of groundwater throughout town must be one the highest environmental priorities for the town and its residents.

Surface Water Protection Areas

The Commonwealth of Massachusetts Regulations for Surface Water Supply Protection (310 CMR 22.20B) outline land use restrictions as they relate to three surface water supply protection zones: A, B, and C. Each zone represents portions of the watershed of a surface water supply:

Zone A comprises:

(a) the land area between the surface water source and the upper boundary of the bank; (b) the land area within a 400 foot lateral distance from the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR 4.05(3)(a); and, (c) the land area within a 200 foot lateral distance from the upper boundary of the bank of a tributary or associated surface water body.

Zone B comprises:

the land area within one-half mile of the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR 4.05(3)(a), or the edge of the watershed, whichever is less. However, Zone B shall always include the land area within a 400-foot lateral distance from the upper boundary of the bank of the Class A surface water source.

Zone C comprises:

the land area not designated as Zone A or B within the watershed of a Class A surface water source as defined at 314 CMR 4.05(3)(a).

The Town of Shutesbury contains two Class A surface water sources: Atkins Reservoir and the Quabbin Reservoir *(see the Water Resources and Wildlife Habitat Map)*. The degree to which land uses are restricted in each zone is based on the source's vulnerability to contamination. For example, the regulations dealing with Zone A are more restrictive than in Zone C. The following uses are prohibited within Zone A:

- Underground storage tanks;
- Above ground storage of liquid hazardous materials including liquid propane and petroleum products, and certain wastewater treatment or disposal facilities;
- Facilities that generate, treat, store or dispose of hazardous wastes;
- Sand and gravel excavation operations;
- Uncovered storage of manure, fertilizers, de-icing materials;
- Junk and salvage operations;
- Motor vehicle repair operations;
- Cemeteries; and,
- Land uses that render impervious of more than 15 percent, or more than 20 percent with artificial recharge, or 2500 sq. ft. of any lot, whichever is greater.

Certain regulations also apply to land uses within Zones B and C. These include the requirement that all on-site subsurface sewage disposal systems, within the Zones A, B, and C must comply with 310 CMR 15.00 (Title 5). In addition, public water supply systems are directed to inspect Zones A, B, and C to ensure compliance with the regulations and to protect the surface water supply.

Vegetation

According to the MassGIS 1999 land use datalayer, nearly 87 percent of Shutesbury is forest. This forest is dominated by red and black oak, red maple, white pine, eastern hemlock, and black birch. Beech, white and yellow birch, and sugar maple are also present. Mountain laurel can dominate the understory in many places.

Non-forested vegetation is relatively rare in Shutesbury. The 2002 GIS land use datalayer indicates that there are 280 acres of open land. Power lines and pasture account for much of this open land. In what is otherwise a densely forested town, these areas of open vegetation represent important visual diversity, relatively unique wildlife habitat, and an opportunity for views.

Forest Land

The 2002 Land Use Map identifies where different forests and agricultural lands are located in Shutesbury. The agricultural lands are predominantly pasture. Forest types include evergreen forests, where eastern hemlock and white pine are the likely dominant species in the overstory (the tallest trees making up the top layer of the forest); deciduous forests comprised of northern red oak, sugar maple, red maple, trembling aspen, paper birch, white ash, and black cherry; and mixed forests where both evergreen and deciduous species are present.

The location of these different vegetative covers relates to both historical land use patterns and local topography. By comparing the 2002 Land Use Map to the Topography Map (*see both maps at the end of this chapter*) it is possible to draw preliminary conclusions about what types of landforms suit different forest types best in Shutesbury: evergreens like lowland and riparian areas while deciduous forest dominate uplands and drier south-facing slopes.

Large areas of evergreen forests of eastern hemlock and white pine are located in several distinct places including plantations near reservoirs. From southwest to northeast these areas include:

- Surrounding and mostly north and east of Atkins Reservoir;
- Straddling Dean and Baker Brooks and the wetlands that are at the headwaters of this drainage area (just north of Baker Reservoir);
- Straddling Roaring Brook and the steep terrain it drains, west of Montague Road;
- Northeast of the Dudleyville marsh to the southern slopes of Morse Hill, to the Town Conservation Area and then to a relatively level area southeast of Ames Pond; and,

- Where the West Branch of the Swift River and the brook, which drains Sibley Swamp in Wendell, drain into relatively gentle sloping land a mile from the shores of the Quabbin Reservoir.

In contrast, *large areas of deciduous forests* appear to be mostly located in upland areas:

- Along the main north-south broad ridgeline from Pelham Hill Road east to the southeastern slopes of the Quabbin Watershed in Shutesbury and north along Wendell Road to the southern boundary of the Lake Wyola Watershed, and;
- On a southwestern facing slope on land located along the Leverett town line just north of Leverett Road.

Rare and Endangered Plant Species

Rare and endangered species information for plants and animals is maintained by the Massachusetts Division of Fisheries and Wildlife's Massachusetts Natural Heritage & Endangered Species Program (NHESP). Habitats for both rare plant and animal populations are documented and mapped by NHESP (as Priority Habitat Maps) under the state Endangered Species Act Regulations. Estimated Habitat Maps delineate the approximate locations of habitats of state-protected wildlife (including vernal pools) under the Wetlands Protection Act Regulations and the Forest Cutting Practices Act Regulations. It is important to remember that the NHESP data base and geographical mapping is limited by what has been identified and documented by scientists – there are extensive areas of the state, including Shutesbury where detailed and comprehensive surveys could result in substantial increases of numbers and locations of rare species and important natural communities.

According to the NHESP, currently there are three state-listed rare plant species or special communities in Shutesbury that have been documented. Table 1-7 lists those plants found to be endangered or of special concern *(see Water Resources and Wildlife Habitat Map)*.

Table 1-7: Rare Plant Species Rated as Endangered and of Special Concern found in the Town of Shutesbury

Scientific Name	Common Name	Taxonomic Group	Rank
Acer nigrum	Black Maple	Vascular Plant	Special Concern
Eleocharis obtusa var ovata	Ovate Spike Sedge	Vascular Plant	Endangered
Goodyera repens	Dwarf Rattlesnake Plantain	Vascular Plant	Endangered

Source: Natural Heritage and Endangered Species Program Website, 2002

According to the NHESP, the Black Maple, last observed in 1929, prefers rich, moist soil associated with floodplain or riparian deciduous forests. The Black Maple does not do well in acidic soils but grows best in shade or filtered sunlight. The Ovate-Spike-sedge, a grass-like plant found in marshes, and the Dwarf Rattlesnake Plantain, a small orchid of coniferous forests have also not been documented in Shutesbury since the 1920s.

Wildlife and Fisheries

The heavily forested Shutesbury landscape provides abundant wildlife habitat for a diversity of species. The following inventory was obtained from the 1999-2004 Town of Shutesbury Open Space and Recreation Plan. Sources cited in the Open Space and Recreation Plan are the Massachusetts Division of Fisheries and Wildlife records of wildlife sightings, Natural Heritage and Endangered Species Program Atlas and database, and a survey of Shutesbury residents.

The following wildlife species (or clear evidence of them) have been sighted in Shutesbury and may be using habitat areas in town for food, shelter, water, and mating needs, and as cover while traveling between habitat areas. Species are listed according to the size of their general habitat needs based on R.M. DeGraaf and D.A. Richard's 1987 "Forest Wildlife of Massachusetts," published by the University of Massachusetts Cooperative Extension Service. This book utilizes cover type, size class, and special habitat relationships to estimate the species that would typically be found in different habitat areas by size of home range (1-10 acres, 11-50 acres, and greater than 50 acres). Species considered to be rare, threatened, or endangered by the NHESP are indicated with an asterisk (*).

According to General Technical Report NE-144, by R. M. DeGraaf et al., "New England Wildlife: Management of Forested Habitats," the area used by wildlife species can fluctuate based on factors such as availability of habitat mixtures (i.e. field, forest, wetland), the type of habitat most used by the species, the species' relative abundance in a particular area, and the season of the year. The procedures used to determine year-round, home ranges of wildlife are complex and are based on estimating individuals' responses to a mix of habitat conditions in different seasons across a given landscape. The information presented below may be best used as a guide in determining how parcels of land and larger groups of parcels might provide year-round habitat for various species. Approximately 64 percent of the 338 forest wildlife species that could potentially be found in New England have average home ranges or territories that are less than ten (10) acres while another 15 percent have home ranges greater than fifty (50) acres. Most raptors, large-bodied woodpeckers, and most medium and large-sized mammals need home ranges in this latter category. However, even areas of undeveloped land less than ten acres in size can provide portions of the year-round habitat needs of both animals with large territories and of migratory species.

Mammals

Forest habitats, home ranges of 1-10 acres in size:
Water shrew*, eastern chipmunk, flying squirrels, woodchuck, grey squirrel, red squirrel, raccoon, and porcupine.

Forest habitats, home ranges greater than 50 acres:
Eastern coyote, skunk, red fox, fisher, white tailed deer, moose, black bear, bobcat, mink.

Birds

Forest habitats, home ranges of 1-10 acres:
Mourning dove, white-throated sparrow, song sparrow, chipping sparrow, slate-colored junco, rufous-sided towhee, purple finch, house finch, northern cardinal, fox sparrow, rose-

breasted grosbeak, evening grosbeak, ruby-throated hummingbird, yellow-bellied sapsucker, eastern wood peewee, eastern phoebe, blue jay, tufted titmouse, Carolina wren, American robin, wood thrush, veery, gray catbird, northern mockingbird, Eurasian starling, cedar waxwing, warbling vireo, solitary vireo, red-eyed vireo, ovenbird, blue-grey gnatcatcher, ruby-crowned kinglet, blackpoll warbler, bay-breasted warbler, Nashville warbler, Connecticut warbler, pine warbler, Kentucky warbler, myrtle warbler [Audubon's warbler], black-throated green warbler, black-throated blue warbler, yellow warbler, common yellowthroat, black-and-white warbler, magnolia warbler, chestnut-sided warbler, common grackle, northern oriole, whippoorwill, bluebird, nighthawks, and cooper's hawk.

Forest habitats, home ranges of 11-50 acres:
Black-capped chickadee, white-breasted nuthatch, American crow, northern goshawk, brown creeper, hairy woodpecker, and northern flicker.

Forest habitats, home ranges of greater than 50 acres:
Barred owl, Common raven, pileated woodpecker, great-horned owl, and saw-whet owl.

Wetland and open types of any size:
Red-throated loon, common loon, great blue heron, double-crested cormorant, pied-billed grebe, red-necked grebe, eared grebe, Canada goose, wood duck, white-winged scooter, black scooter, mallard, lesser scaup, greater scaup, old squaw, ring-necked duck, bufflehead, snow goose, common goldeneye, black duck, hooded merganser, common merganser, osprey, merlin, sharp-shinned hawk, bald eagle, red-tailed hawk, peregrine falcon, cliff swallow, bank swallow, barn swallow, tree swallow, spotted sandpiper, American crow, black-backed gull, herring gull, little gull, red-winged blackbird, kingfisher

The following birds, not listed above, were sighted in Shutesbury as part of Biodiversity Days 2002:
American goldfinch, American woodcock, Baltimore oriole, Blackburnian warbler, blue-winged teal, brown-headed cowbird, common yellowthroat, great blue heron, hermit thrush, house wren, purple martin, scarlet tanager, turkey vulture, white-breasted nuthatch, wild turkey, winter wren.

Amphibians and reptiles
Forest habitats, home ranges of 1-10 acres:
Garter snake, water snake, ring neck snake, brown snake, milk snake, painted turtle, American toad, bull frog, gray treefrog, green frog, pickerel frog, spring peeper, wood frog, red-spotted newt, redback salamander, spotted salamander, dusky salamander, two-lined salamander, spring salamander*, marbled salamander*, four-toed salamander*, box turtle, snails.

Forest habitats, home ranges of 11-50 acres:
Wood turtle*, timber rattlesnake * (the timber rattlesnake is an endangered species in Massachusetts, which is not listed as being located in Shutesbury by the NHESP).

Wetland and open habitat areas:
Snapping turtle, spotted turtle*.

Rare Fish and Wildlife Species

As stated above under Rare and Endangered Plant species, the NHESP maintains statewide records and maps of state-listed rare plant and animal species identified and documented by scientists (subject to the limitation that statewide comprehensive surveys for rare species have never been undertaken). The Town of Shutesbury provides habitat for seven wildlife species that are documented as Threatened and of Special Concern (*see Table 1-8*). The species that most often catch the public's eye are those that are considered "desirable" such as the Atlantic Salmon. While the importance of this species is undeniable, lesser-known species should not be overlooked since all play a crucial role in ecosystem health. Given this reality, protecting the habitat areas of these species should be considered a top priority.

Table 1-8: Rare Fish and Wildlife Species Rated as Threatened and of Special Concern and Found in the Town of Shutesbury

Scientific Name	Common Name	Taxonomic Group	Rank
Clemmys guttata	Spotted Turtle	Reptile	Special Concern
Clemmys insculpta	Wood Turtle	Reptile	Special Concern
Notropis bifrenatus	Bridle Shiner	Fish	Special Concern
Hemidactylium scutatum	Four-Toed Salamander	Amphibian	Special Concern
Ambystoma opacum	Marbled Salamander	Amphibian	Threatened
Gyrinophilus porphyriticus	Spring Salamander	Amphibian	Special Concern
Sorex palustris	Water Shrew	Mammal	Special Concern

Source: Mass. Natural Heritage and Endangered Species Program Website, 2002.

2000-2002 Biodiversity Days Inventory

According to the inventory lists acquired through the Massachusetts Executive Office of Environmental Affairs' Biodiversity Days website, there were 617 sightings of plants and animals in town recorded by residents during field trips over the past three years. This list includes ninety-four trees and shrub species, ninety-nine wildflowers, nineteen different ferns and fern allies, grasses, sedges, and rushes, birds, fish, insects, bats, and mammals.

Natural Heritage Endangered Species Program: Estimated Habitats of Rare Wildlife and the BioMap

The NHESP publishes the Massachusetts Natural Heritage Atlas, which includes maps that show Priority Habitats of Rare Species and Estimated Habitats of Rare Wildlife and Certified Vernal Pools. This information is also available as digital data provided through the state's MassGIS office. According to the 2000-2001 Atlas, several rare species habitats are located within Shutesbury (s*ee Water Resources and Wildlife Habitat Map*). These habitats can be found in the following locations in the Town of Shutesbury: in the eastern section of

Shutesbury along Atherton Brook and within the Quabbin Watershed; lands surrounding the Atkins Reservoir on the western border with the Town of Amherst; in the southwestern-most corner of Shutesbury on its border with Amherst and Pelham; and along Roaring Brook near Pratt Corner Rd.

To supplement the specific rare species habitat information and mapping described above, and to preserve and sustain the Commonwealth's biodiversity on a more comprehensive scale, in 2001 the NHESP published the *BioMap, Guiding Land Conservation for Biodiversity in Massachusetts*. The NHESP's BioMap is based upon a scientific distillation of existing data of endangered species and natural community data to identify the areas most in need of protection in order to protect the native biodiversity of the Commonwealth. The BioMap project is intended to promote the strategic land protection of areas that provide suitable habitat over the long term for the maximum number of Massachusetts terrestrial and wetland plant and animal species and natural communities. The BioMap shows areas designated as Core Habitats and Supporting Natural Landscapes. The Core Habitat areas include the most viable habitat for rare plants and rare animals and exemplary natural communities. The Supporting Natural Landscapes includes buffer areas around the Core Habitats, large undeveloped patches of vegetation, large "roadless" areas, and undeveloped watersheds. The Core Habitat areas were identified through existing data and field surveys, and support viable long-term populations of rare plant and animal species. The Supporting Natural Landscape areas were determined through analyses using Geographic Information Systems (GIS) mapping programs.

According to GIS data, Core Habitat covers approximately 7,315 acres or 42 percent of the town. Supporting Natural Landscape Covers approximately 3,077 acres or 18 percent of the town. The largest Core Habitat area is located within the Quabbin Watershed (6,794 acres or 93% of all the Core Habitat area). West of the Quabbin Watershed Core Habitat are three smaller but significant Core Habitats. Just over one mile to the southwest of the Quabbin Core Habitat in Belchertown is the Holyoke Range Core Habitat. Approximately five miles to the west is the Mt. Toby Core Habitat and to the northwest, another five miles is the Montague Plains Core Habitat. A review of the BioMap shows that there is only a third of a mile gap between the Quabbin sub-watershed and the Mt. Toby Core Habitats, via a Core Habitat area and Supporting Natural Landscapes in Shutesbury. The Core Habitat area in Shutesbury, other than that of the Quabbin sub-watershed, is located in the Roaring Brook sub-watershed, northwest of the intersection of Montague Road and Leverett Road. Bridging this gap would seem to support the long-term viability of plant and animal populations and potentially the movement of some species between core habitat areas *(see Open Space Map).*

Conserving Shutesbury's Biodiversity: Protecting Core Habitat Areas, Supporting Natural Landscapes, and Large Blocks of Contiguous Forest

Overall, 78 percent of the respondents to the Shutesbury Master Plan Survey felt that it was very important to conserve wildlife habitat. A review of the Biodiversity Days 2000-2002 list of plant and animal sightings in Appendix B signifies that Shutesbury's forests and wetlands, brooks, ponds, lakes and reservoirs are teeming with a great variety of life.

A discussion on the ways the Town of Shutesbury can continue to provide habitat for this great number of species must consider many factors including the impacts of development on habitats; the location of existing open space lands in relation to the very large and protected wildlife habitat area in the Quabbin Watershed; and the manner in which conservation planning will deal with the different movement and habitat needs of wildlife in the future. There are two concepts that can be used to help explain Shutesbury's options for pursuing the conservation of the town's biodiversity: Island Biogeography and landscape ecology models.

The study of Island Biogeography shows that biodiversity is greater on large islands than on small ones and greater on islands that are closer to the mainland. This has been extended to the idea of islands of protected open space surrounded by developed areas with the conclusion that increasing the size of a protected area increases its biodiversity. This suggests that connecting two already protected areas with a protected corridor to create one large area from two smaller separated ones will also increase natural biodiversity. The principles of Island Biogeography also suggest that biodiversity increases with proximity to other protected areas, so that nearby protected land is also valuable for this purpose.

Another model for planning for wildlife habitat protection is "Aggregate with Outliers," which is described in Richard T. T. Forman's book, "Land Mosaics." Such a landscape configuration would aggregate like uses while still allowing small bits of other uses. In Shutesbury the model is already somewhat reflected in the two more densely developed areas (Lake Wyola and Shutesbury Center), the large unfragmented blocks of protected forest, the very small patches of open land, and the residential development aggregated along roads.

Individuals of wildlife and fisheries populations move within a landscape. When and where wildlife and fish species move is not completely understood by wildlife biologists. What is known is that given a mostly undeveloped landscape, as in Shutesbury, animals pay little attention to political boundaries or the presence of homes scattered along roadways. However, in a mostly developed landscape, as can be seen in some eastern Massachusetts communities within the Rte. 495 corridor, wildlife seek natural cover for shelter and food, but some species willingly forage where human uses, such as gardens or horticultural and ornamental plantings, provide browse or food. As the forest land within Shutesbury continues to be fragmented by development, remaining large blocks of undeveloped forest and the parcels of land connecting them together will become more important to area wildlife.

Connections between bodies of water and sub-watersheds are also important for wildlife and fisheries species. The more common animals that utilize the river and stream corridors are beaver, muskrat, raccoon, green heron, king fisher, bittern, snapping turtle, and many species of ducks, amphibians, and fish. Since many species rely on a variety of habitats during different periods of their life cycle, species diversity is greatest in areas where several habitat types occur in close proximity to each other. With this in mind, the protection of all habitat types is vital for maintaining and enhancing biodiversity in Shutesbury.

How will residents and town officials determine the quality of the wildlife habitat in Shutesbury and the most appropriate conservation strategies? There are three general paths

to follow in conserving the health of wildlife populations. One way is to protect the habitat of specific species that are rare, threatened, or endangered, which might be accomplished by protecting the BioMap Core Habitat Areas, the Estimated Habitats of Rare Wildlife, and the Estimated Priority Habitats of Rare Species. It is thought that while protecting their habitats other species will also benefit. A second path is to conserve certain landscape-level resources like large contiguous forests or riparian habitats along rivers, which is similar to protecting the BioMap Supporting Natural Landscapes. This helps to conserve the habitats of a large number of species but it might lose sight of some rare and endangered species. However, conserving the long-term biodiversity of Shutesbury will likely require a combination of the first two paths. This third approach is to protect the BioMap core habitat areas, the supporting natural landscapes, (plus any additional rare species habitats and special or unique communities and features not identified in the BioMap project), and the lands that link them across a regional landscape.

Recognizing the general areas where wildlife mate, feed, and travel is often the first step. Large, round forest patches of more than 185 acres provide interior forest habitats for a variety of birds and mammals, as well as protection of first and second order stream tributaries (Formann; 1995). Networks or greenways of protected forestland or vegetated riparian corridors are resources that will help to sustain populations of animals that require diverse habitats over time and space. There is a great degree of forestland that is protected stretching from Warwick through the eastern half of Erving, to Wendell, Shutesbury, and New Salem to the Quabbin Watershed and west to the Connecticut River riparian corridor. Shutesbury's sparsely populated terrain contributes to the wildlife value provided by the protected forestland throughout this greenway.

Another way of categorizing forestland is by comparing blocks of forest by their degree of fragmentation. In other words, areas of contiguous forest, unbroken by paved roads, power lines, or development have a higher habitat value for wildlife populations, which require deep forest cover. Since fragmentation of forestland is a direct outcome of development, edge habitats (e.g. zones of change between forests and development) would not be as high a priority for conservation as large blocks of forest. The Franklin County Contiguous Forest by Forest Acreage Map (Contiguous Forest Map) identifies areas of contiguous forest by size class. Blocks of contiguous forest were identified using GIS mapping techniques. The method used included buffering all land uses other than forest and forested wetlands by 100 feet. The blocks of contiguous forest were identified as separate units and their areas in acres were measured.

The Contiguous Forest Map shows blocks of forest by size class in Shutesbury and surrounding towns. Shutesbury contains portions of two blocks of forest each greater than 10,000 acres in size. One stretches north of Cooleyville Road and east of Wendell Road into southeastern Wendell and northwestern New Salem. This northeastern forest block is found within the Quabbin Reservoir and Lake Wyola Sub-watersheds and contains both Core Habitat Areas and Supporting Natural Landscapes. Another 10,000 acre block of contiguous forest lies southeast of Rte. 202 and runs into New Salem. This large southeastern forest block is also in the Quabbin Sub-watershed and is considered a Core Habitat. Only one other region in Franklin County contains blocks of contiguous forest of this size class: the Heath-Charlemont-Colrain forest block.

Another large block of contiguous forest (5,000 –10,000 acres in size) lies west of Montague Road. This forest block includes Brushy Mountain, the area in Shutesbury known as the Plains, and the only Core Habitat Area in Shutesbury outside of the Quabbin Sub-watershed. There are blocks of forest between 1,000 and 5,000 acres in size located south of Leverett Road in the Quabbin, Amethyst, and Adams Brook Sub-watersheds. These southern forest blocks protect valuable drinking water supplies.

Forests have always been known to play an important role in providing habitat for many plant and wildlife species. Since the 1980s it has been commonly thought that New England forests have lacked the diversity of stand age classes, which existed in the earlier part of the century due to the presence of many old fields. One of the ways used to create more acres of young forest was by clearcutting trees in small patches throughout a woodland. Foresters considered this to be a choice wildlife habitat treatment for producing early successional habitats within a managed woodland. Periodic heavy logging of forestland can also create early successional habitats. The Massachusetts Division of Fisheries and Wildlife (DFW) uses a percentage of the income derived from hunting and fishing licenses for the purchase of wildlife habitat and important research into wildlife management. On some of their properties the DFW reclaims old fields with large brush cutting machinery for the purpose of creating habitats for wildlife that require young tree and shrub communities common to early successional landscapes. The species that inhabit these early successional landscapes include common game species and many rare and endangered species. Any open land in Shutesbury is thus extremely important as potential habitat for species requiring early successional habitats.

Shutesbury clearly has a wonderful resource in both its wildlife and its diverse habitats. Town officials and concerned citizens may need to take action to conserve thriving plant and animal communities in Shutesbury. The conservation strategies that the town pursues over time may involve continued and increased monitoring of species locations, numbers, and movements; the protection of unprotected core habitat areas, as identified by the NHESP BioMap that includes estimated habitats of rare wildlife (*see Open Space Map*); the continued protection and linking of large blocks of contiguous forestland, which comprises Shutesbury's Supporting Natural Landscape; the creation and retention of early successional habitats like fields and grasslands; and the protection of vernal pools and associated uplands, wetlands, and riparian corridors that sustain the greatest diversity of life in Shutesbury.

Open Space

The following section, Open Space, inventories public and private lands in the Town of Shutesbury, which are valued for their conservation and recreation resources and, which also have some level of protection from development. Although descriptions of a select set of town-owned open space parcels include their recreational values, descriptions of these lands will be covered in greater detail in the Master Plan Chapter, Community Facilities and Services.

Why does a town, as rural as Shutesbury, need to engage in open space planning? Some communities along the Route 495 corridor in eastern Massachusetts initiated open space protection programs only after their remaining forests and farmland had become targeted for development. Unfortunately, if Shutesbury were to wait for development pressures to intensify before protecting land it could find house lots covering the recharge area for current or future groundwater supplies, or find the cost of open space protection prohibitive.

The phrase "open space protection" refers to any number of mechanisms that help to keep land from being developed or in other words, converted to commercial, industrial, or residential land uses. The term "**protected**" for the purposes of this Master Plan indicates that no development may take place and a conservation restriction or some other legal mechanism is attached to the deed. In addition, land is considered protected from development when it is owned by the Commonwealth of Massachusetts and managed by a state conservation agency like the Department of Conservation and Recreation (DCR). Land is also considered protected when it is owned by a town and under the authority of the Conservation Commission, or when it is owned by a land trust for conservation purposes. Changing the level of protection for any parcel of land that is owned by a state conservation agency, a land trust, or by a town for conservation purposes, requires a vote by two thirds of the State Legislature as outlined in Article 97 of the Amendments to the Massachusetts State Constitution. For the purposes of this Master Plan, an additional type of open space will be considered as protected from development: cemeteries.

A parcel of land in Massachusetts may be considered to have "**limited protection**" from development when a town water department or water district owns it. Unless there is a legal restriction attached to the deed, the level of protection afforded these types of parcels varies depending on the policies of each community. In most cases the town or water district would be required to show the Massachusetts Department of Environmental Protection just cause for converting the use of the land. However, this is not an insurmountable hurdle. Athol recently took their surface drinking water supplies off-line after developing the productive Tully River well-field. A change in land use around the reservoir may be in the offing, from watershed protection to active recreational uses.

Land owned by the Town of Shutesbury and used for recreation or conservation purposes but not under the authority of the Conservation Commission is "**unprotected, undeveloped town land**." The parcel in question could be used as a soccer field or it could be in forest, but not have the long-term protection afforded by Conservation Commission lands. In this case, converting a soccer field to a built use like a new school could be decided by the Select Board.

"**Temporarily protected**" parcels are those that are enrolled in the Chapter 61 tax abatement programs. They offer landowners a reduction of their local real estate property taxes in return for promising that the predominant use of the land will be as productive forest, agriculture or for use as open space for a period of time. These tax abatement programs help landowners by reducing their property taxes while they grow forest products and keep land undeveloped. By keeping forest and fields in their undeveloped states, lands in these programs provide many public benefits from retaining the value of the region's wildlife

habitats and recreational open space to sustaining Shutesbury's rural character, and keeping property taxes down since the use requires very little in the way of town services. Another benefit of the tax abatement programs is that they can provide Shutesbury an opportunity to protect land. When a parcel, which has been enrolled in one of the Chapter 61 programs is put up for sale, or when the current owner initiates plans to convert the land to a use different than is described by the abatement program, the town is guaranteed a 120-day waiting period during which it can exercise its right-of-first-refusal to purchase the property. However, an important limitation of the Chapter 61 programs is that a landowner can remove property from the program and pay any back taxes that may be owed, and after a period of time (120 days) during which the town has the right of first refusal, sell or convert the land to another use. Table 1-9 lists the amount of acres of these categories of undeveloped open space in town by level of protection and ownership.

Table 1-9: Number of Acres of Protected Open Space in Shutesbury by Level of Protection from Development and by Owner

LAND PROTECTED FROM DEVELOPMENT	**Number of Acres**
Publicly Owned	
Commonwealth of Massachusetts – Department of Conservation and Recreation (Division of Water Supply Protection)	5,035.5
Commonwealth of Massachusetts – Department of Conservation and Recreation	757
Town of Shutesbury – Cemeteries	10
Town of Shutesbury – Conservation Commission	135.4
Connecticut River Watershed Council (Public non-profit)	1
Total Publicly Owned	**5,939**
Privately Owned	
Land protected with a Conservation Restriction	314.3
Land protected with an Agricultural Preservation Restriction	137
Jewish Community of Amherst Cemetery	2
Total Privately Owned	**453**
Total Land Protected from Development	**6,392**
LANDS WITH LIMITED PROTECTION FROM DEVELOPMENT	
Publicly Owned	
Town of Amherst – Atkins Reservoir Water Supply Protection Land	677
Total Land with Limited Protection	**677**
UNPROTECTED AND UNDEVELOPED TOWN LAND	
Town of Shutesbury	37.5
Total Unprotected Undeveloped Town Land	**38**
LANDS TEMPORARILY PROTECTED FROM DEVELOPMENT	
Privately Owned	
Chapter 61 – Forestry	5,555.9
Chapter 61A - Agriculture	68
Chapter 61B – Recreation	457.2
Total Land with Temporary Protection	**6,081**
Total Land of Conservation and Recreation Interest with Some Level of Protection from Development or with Town Ownership	**13,188**

Source: Town of Shutesbury Assessors Records, 2003.

It is important for the Town of Shutesbury to consider land under Chapters 61, 61A or 61B as unprotected, or "**temporarily protected**." At the same time, the value the program offers to the town should not be disregarded. The Shutesbury Planning Board and Conservation Commission have already begun to take advantage of the town's right-of-first-refusal, as with the South Brook property, and with Haskins Meadow earlier. Identifying key parcels and building partnerships with local land trusts and landowners can be an effective planning process resulting in efficient land protection projects. Shutesbury may not need to purchase the land with town funds. The right-of-first-refusal can be given to a land trust, which can often respond much more quickly than the town can.

Inventory of Types of Open Space

The following section inventories all of the parcels of land that fall within three categories of open space. These parcels are listed by protection status: protected, limited protection, and temporary protection. These resources are identified on the Open Space Map found at the end of this chapter. It is important to note that there maybe other lands of significant conservation and/or recreation interest to the town that are not inventoried here, simply because they do not fall within these three categories. For example, a parcel of land might not be listed here that includes important wetlands, rare species, or other significant or unique features (including the fact that its location provides a link between important blocks or corridors of protected or otherwise important conservation or recreation lands).

Protected Parcels

Overall, the 6,392 acres of protected land in Shutesbury represent 37 percent of the total land area in town (17,342 acres). Developing these protected parcels for other than conservation use would require an affirmative vote by two thirds of the State Legislature. This is what separates different levels of open space protection, the ease in which its conservation status may be overturned. Lands that are protected from development in the Town of Shutesbury include both publicly and privately owned land. The publicly owned parcels are owned by the Town of Shutesbury's Conservation Commission and the Commonwealth of Massachusetts and managed by the Department of Conservation and Recreation (Division of Water Supply Protection). A public non-profit, the Connecticut River Watershed Council, owns one one-acre parcel in Shutesbury off Jennison Road. The privately held parcels of land, which are protected from development in perpetuity, include lands that have conservation easements attached to their deeds. For example, the development rights for the Banfield Parcels are held in perpetuity by the Department of Food and Agriculture through their Agricultural Preservation Restriction (APR) Program.

The parcels listed in Table 1-10 show ownership status and owner. In addition, the parcels' Assessors information is also listed including the map and lot numbers and assessed acreage. Following the table are descriptions of each parcel or group of parcels depending on ownership. For example, the Department of Conservation and Recreation (Division of Water Supply Protection) is represented in the table as many separate parcels that are described together in the text.

Table 1-10: Open Space Parcels in Shutesbury Protected from Development

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Publicly Owned	**Commonwealth of Massachusetts/Department of Conservation and Recreation (DCR)**			
	Shutesbury State Forest	M	33	50
		M	34	27
		M	35	29
		M	36	26
		M	37	26
		M	41	10
		N	23	45
		N	37	46
		N	51	25
		N	55	1
		N	61	50
		N	62	50
		N	66	43
		N	67	55
		N	68	80
		N	69	152
	Total			**715**
	Lake Wyola State Park	B	648	0.1
		C	5	31
		C	9	8
		C	11	3
	Total			**42**
	Total DCR Lands			**757**
Publicly Owned	**Commonwealth of Massachusetts/Department of Conservation and Recreation (Division of Water Supply Protection)**			
	Quabbin Reservoir Watershed Land	J	1	32
		J	2	30
		J	5	44
		J	6	44
		J	7	9
		K	1	11
		K	2	20
		K	3	41
		K	4	10
		K	6	10
		K	7	5
		K	10	51
		K	12	16
		K	13	30
		K	14	72
		K	15	5
		K	16	53
		K	21	14
		L	1	21
		L	2	15

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Publicly Owned	*Quabbin Reservoir Watershed Land (Continued)*	L	4	24
		L	5	21
		L	6	10
		L	7	30
		L	8	22
		L	10	23
		L	11	61
		L	12	19
		L	13	19
		L	14	8
		L	23	6
		L	24	151
		L	25	95
		L	26	70
		L	27	61
		M	17	27
		M	19	3
		M	21	21
		M	31	42
		M	32	50
		M	38	5
		N	6	0.1
		N	7	0.2
		N	8	5
		N	9	0.3
		N	10	44
		N	11	5
		N	12	9
		N	13	8
		N	14	1
		N	15	12
		N	18	98
		N	19	8
		N	20	26
		N	21	51
		N	22	15
		N	25	45
		N	26	25
		N	27	8
		N	28	47
		N	29	43
		N	30	87
		N	31	12
		N	32	17
		N	33	10
		N	35	9
		N	36	26
		N	38	17
		N	39	16
		N	40	30
		N	41	51

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Publicly Owned	*Quabbin Reservoir Watershed Land (Continued)*	N	42	14.6
		N	43	14
		N	44	161
		N	46	131
		N	47	34
		N	48	79
		N	49	15
		N	50	19
		N	52	23
		N	53	20
		N	54	32
		N	56	17
		N	57	5
		N	58	23
		N	63	35
		N	64	60
		N	74	0.3
		N	75	1
		P	6	16
	Total Acreage from Assessors' parcels			2,726.5
	Remainder of DCR/DWSP land excluded from Assessors' maps.			2,309.0
	Total DCR/DWSP Lands			**5,035.5.**
Publicly Owned	**Town of Shutesbury Conservation Commission**			
	Garbiel Gift	B	293, 305, 306, 315 & 341	1.4
	Lake Wyola Island	B	679, 698	1
	Lake Wyola Conservation Area	B	800	48
	South Brook Conservation Area	E	3	49
	Montague Road Lot (abuts Dudleyville marsh)	F	49	3
	Mt. Mineral Road Lot	J	3	2
	Haskins Meadow	X	7	21
		X	34	10
	Total Conservation Commission Lands			**135.4**
	West Cemetery	P	29	1
		P	31	2
		P	33	1
		P	34	2
		P	35	2
		P	36	0.2
	Lockes Pond Village Cemetery	D	10	1
	Pratt Corner Cemetery	U	7	0.3
	Total Municipal Cemeteries Land			**10**
	Town Common	M	1,2,4	**0.7**
Public Non-Profit	**Connecticut River Watershed Council**	I	2	**1**
	TOTAL PUBLICLY OWNED PROTECTED LANDS			**5,939.2**

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Privately Owned	**Agricultural Preservation Restrictions**			
	Banfield (Owner), DFA (Manager)	V	5	**137**
	Conservation Restrictions			
	Levinger (Owner), DCR (Manager)	K	28	131
		K	32	8
	Pearson (Owner), Conservation Commission (Manager)	Q	20	7
	Pearson (Owner), Conservation Commission (Manager)	Q	75	3
	Old Orchard Homeowners Association	D	32	24
	(Owner and Manager)	D	33	3
		D	78	0.1
		D	79	0.2
		D	98	0.4
	Janowitz (Owner), DCR (Manager)	K	23, 26, 118	140.6
	Total Land with Conservation Restrictions			**314.3**
	Privately owned Cemetery			
	Jewish Community of Amherst	T	115	**2**
	TOTAL PRIVATELY OWNED PROTECTED LAND			**456.3**
	TOTAL PROTECTED LAND			**6,395.5**

Source: Town of Shutesbury Assessors Records; 2002. *Note: The acreage figures from the 1999-2004 Open Space and Recreation Plan were used for the DCR and DCR/DWSP lands. However, due to increases in lands received by the Conservation Commission, all other acreage totals used in the total acreage figures were from 2002 Assessors' records.

Selected Publicly Owned Protected Open Space Areas

The publicly owned protected land in the Town of Shutesbury is owned by the Commonwealth of Massachusetts and the Town of Shutesbury's Conservation Commission. The State's open space is managed by the Department of Conservation and Recreation. As mentioned before, the following descriptions are for groups of parcels under the same ownership.

Landowner: Department of Conservation and Recreation (Division of Water Supply Protection).
Identifier: Quabbin Reservoir Watershed Land.
Over 5,000 acres of the Quabbin Reservoir Watershed lands and surface water define the land area of the eastern third of the Town of Shutesbury. The Quabbin Reservoir Watershed offers a number of recreational opportunities available for public use including hiking, picnicking and nature study. In the northern end of the Reservoir, fishing, boating, and hunting are permitted. Together with the Shutesbury State Forest and private lands, the DCR/DWSP lands represent a very large Core Habitat Area as is shown on the Open Space Map. According to the Natural Heritage and Endangered Species Program, protection of

Core Habitat Areas and Supporting Natural Landscapes will help to ensure the long term integrity of the region's biodiversity.

Landowner: Massachusetts Department of Conservation and Recreation (DCR).
Identifier: Shutesbury State Forest.
The Shutesbury State Forest is owned by the State and managed by DCR. Located in the northeastern section of Shutesbury, the Shutesbury State Forest is comprised of three separate groups of parcels. The largest group of parcels contains approximately 500 acres (2002 Assessors' records) and is located along Macedonia Road. The outflow of Sibley Swamp in Wendell runs through this section. The second largest group of parcels is approximately 121 acres in size and is accessed via Briggs Road on its northern end and Cooleyville Rd on its southern end. A locked gate greets visitors from Cooleyville Road. A final parcel owned by DCR is located off of New Boston Road and east of the West Branch of the Swift River. Residents enjoy hiking, fishing and hunting within the State Forest.

Landowner: Massachusetts Department of Conservation and Recreation (DCR).
Identifier: Lake Wyola State Park (Carroll Holmes Recreation Area).
In 1997, the Department of Conservation and Recreation purchased the former privately-run Lake Wyola Park. Lake Wyola State Park, as it is now known, is located on the north side of Lake Wyola. The Park offers swimming and fishing. There is a universal access beach and other universal access facilities located in the state park and recreation area. The beach is located on Lakeview Rd.

Landowner: Town of Shutesbury.
Identifier: Lake Wyola Island.
Recently the Town of Shutesbury Conservation Commission acquired a small island with access off Merrill Drive, a private way that intersects Lakeview Road near the northeastern shore of Lake Wyola. Part of the parcel also represents the land underneath the water that separates the island from shore.

Landowner: Town of Shutesbury.
Identifier: Lake Wyola Town Beach and South Brook Conservation Area.
Located on the south side of Lake Wyola in the northeast corner of the Town of Shutesbury, and accessed via Randall Road, the Town Beach Area and the two abutting conservation parcels, including the recently acquired South Brook Conservation Area, provide public access to cross country skiing, fishing, swimming, hunting, ice skating, boating, nature observation, picnicking, and snowmobiling. The Town Beach Area is accessed via Randall Road and contains a large dirt parking area for cars and boat trailers. Trails that start off Randall Road and Lock's Pond Road lead to roughly 100 acres of protected conservation land.

Landowner: Town of Shutesbury.
Identifier: Haskins Meadow.
This thirty-one (31) acre meadow area abuts Amherst and Leverett town conservation land. It appears that the best way to access the meadow is via Cushman Road in Amherst or from the closed Leverett landfill.

Landowner: Town of Shutesbury.
Identifier: Montague Road Lot.
Located at the northwestern end of Montague Road on the Shutesbury/Leverett town line. This three-acre parcel includes upland white pine and mountain laurel and is bounded on the east by Montague Road, on the south partially by an old road to North Leverett, and on the northwest by bog.

Lands with Limited Protection from Development

Land owned by the Town of Amherst and managed by the Amherst Water Department as watershed or public water supply areas are typically considered as having limited protection from development unless there is a conservation restriction attached to the deed barring development in perpetuity (See Table 1-11).

Table 1-11: Open Space Parcels in Shutesbury with Limited Protection from Development

Owner	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Town of Amherst/*Adams Brook Sub- watershed Land*	T	3	16
	T	4	9
	T	11	13
	T	12	24
	U	3	5
	U	5	2
	U	6	114
	U	8	14
	U	9	136
	U	12	10
	U	13	67.3
	U	26	9
	U	44	1
	V	7	6
	V	8	2
	V	12	2
	V	13	21
	V	32	8
	W	1	7
	W	2	1
	W	3	0.1
	W	7	0.4
	W	8	15.6
	W	9	14
	W	10	28
	W	11	20
	W	12	22
	W	13	11
	W	14	12
	W	29	70
	W	31	2
	W	33	1

Owner	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Town of Amherst/***Adams Brook Sub- watershed Land***	W	47	0.4
	X	1	4
	X	2	9
	X	3	0.4
Total Town of Amherst Land			**677**

Source: Town of Shutesbury Assessors Records; 2002.

Unprotected Undeveloped Town Land

Unprotected undeveloped town land includes parcels that may be currently used for recreational or conservation purposes that are under the control of the Select Board. In this case changing a parcel's use from forestland for example to the site of a new elementary school may require a Select Board vote, but not an affirmative vote by two thirds of the State Legislature.

Table 1-12: Unprotected and Undeveloped Town Land with Conservation and Recreational Value

Location of Town Land	Assessors' Map #	Assessors' Lot #	Assessors' Acreage
Lake Wyola-southeastern parcel(water and wetland)	A	49	3.6
Lake Drive rectangular lot	B	10	0.1
Oak Knoll rectangular lot	B	22	0.1
Great Pines Drive rectangular lot	B	27	0.1
Great Pines Drive rectangular lot	B	28	0.1
Lockes Pond Road rectangular lot	B	153	0.1
Great Pines Drive rectangular lot	B	167	0.1
Great Pines Drive rectangular lot	B	169	0.1
Watson Straights triangular lot	B	524	0.1
Lake Shore Drive rectangular lot	B	661	0.1
Lakeview Road rectangular lots	B	709,710	0.2
Mt. Mineral Road lot	J	3	1.7
Wendell Road Lot	M	30	8
New Boston Road rectangular lot	N	65	11.1
New Boston Road triangular lot	N	70	2.7
Town Soccer Field Behind Fire Station	O	37, 38	3
Town land (McNeil lot) behind Town Hall	O	43	3
Town field behind Town Hall	O	47	3
Town land (McNeil lot) behind Town Hall	O	48	6
Old Town Pound	O	55	0.1
Rose Lot	O	68	2.6
Cyrus Hill Lane	S	2	0.3
Elementary School Playing Fields and Woods	T	78	8
Cyrus Hill Home site (c. 1875)	U	23	0.13
Total Shutesbury Unprotected Undeveloped Land			**37.5**

Source: Town of Shutesbury Assessors Records; 2002.

Much of the land in this category is used for recreational purposes including the fields in back of the Fire Station, Elementary School, the Town Common, and the field in back of the

Town offices. Although a portion of these parcels have already been developed, some of the land remains as undeveloped open space. There are also a number of parcels owned by the town surrounding Lake Wyola. Some of these parcels are small, unmarked and may require more inspection to ensure that their use is consistent with town policies. A more detailed assessment of each parcel will be included in the Community Facilities and Services Chapter of the Master Plan (*see Table 1-12*).

Parcels Temporarily Protected from Development

In Massachusetts, parcels of open space that are considered to be temporarily protected from development are those that are enrolled in the State's tax abatement programs, Chapter 61, 61A, and 61B (*see Table 1-13*).

Table 1-13: Privately Owned Open Space Parcels in Shutesbury with Temporary Protection from Development

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61	HEMINGWAY JAMES C	D	12	48
	KRAFCHUK ELIZABETH	D	14	65
	CITINO FRANK	D	16	33
	OLSZEWSKI MARK	D	18	17
	BROWN ROBERT S ESTATE	D	20	68
	BROWN ROBERT S	D	21	65
	BROWN ROBERT S	D	24	15
	MILLER JEAN	D	25	11
	MILLER JEAN	D	28	55
	MILLER JEAN	D	29	34
	FOOTIT BARBARA F	D	31	36
	W D COWLS INC	D	37	11.5
	W D COWLS INC	D	39	45.7
	MILLER JEAN	D	41	1.3
	CRAWFORD MOORE LLC	D	102	74
	CRAWFORD MOORE LLC	D	103	3
	CRAWFORD MOORE LLC	D	104	5
	FOOTIT BARBARA	E	2	252
	PUFFER STEPHEN J	F	1	32
	W D COWLS INC	F	15	64.89
	W D COWLS INC	F	16	12.5
	W D COWLS INC	F	17	69.4
	PUFFER EDWARD K	F	23	86
	W D COWLS INC	F	24	95.5
	W D COWLS INC	F	25	13
	W D COWLS INC	F	30	4
	W D COWLS INC	F	32	119
	BONNAR DEACON	F	34	15

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61 (Continued)	MIZAUR CAROLE J	F	35	22
	W D COWLS INC	F	37	7.4
	W D COWLS INC	F	38	10.2
	W D COWLS INC	F	39	40.9
	W D COWLS INC	F	40	20
	W D COWLS INC	F	41	20
	MILLER JEAN G	F	45	19
	MILLER JEAN G	F	47	30.2
	W D COWLS INC	F	53	4.6
	W D COWLS INC	F	100	1
	W D COWLS INC	F	101	1
	W D COWLS INC	F	102	1
	W D COWLS INC	F	103	1
	W D COWLS INC	F	104	1
	W D COWLS INC	F	116	1
	W D COWLS INC	F	117	1
	W D COWLS INC	F	118	1
	W D COWLS INC	F	119	1
	W D COWLS INC	F	120	1
	W D COWLS INC	F	121	1
	W D COWLS INC	F	122	1
	W D COWLS INC	F	123	1
	W D COWLS INC	F	124	1
	W D COWLS INC	F	126	2
	W D COWLS INC	F	127	2
	W D COWLS INC	F	128	2
	W D COWLS INC	F	129	2
	W D COWLS INC	G	2	811
	W D COWLS INC	G	3	0.3
	W D COWLS INC	G	4	2.2
	W D COWLS INC	G	5	0.9
	W D COWLS INC	G	6	20.1
	W D COWLS INC	G	8	2.5
	W D COWLS INC	G	25	1
	W D COWLS INC	G	26	1
	W D COWLS INC	G	27	1
	W D COWLS INC	G	28	1
	W D COWLS INC	G	29	1
	W D COWLS INC	G	32	1
	W D COWLS INC	G	33	1
	WATKINS LEE MARK	H	10	16
	W D COWLS INC	H	12	0.7

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61 (Continued)	W D COWLS INC	H	13	7.6
	W D COWLS INC	H	30	33.9
	RICHTER SCOTT S	H	36	46.5
	RICHTER SCOTT S	H	37	100
	W D COWLS INC	H	46	24
	W D COWLS INC	H	47	25.6
	W D COWLS INC	H	48	7.5
	W D COWLS INC	H	49	7.3
	W D COWLS INC	H	51	5.8
	HAYES RAYMOND & JOANNA	H	54	24
	PLAZA JAMES M	H	56	14
	W D COWLS INC	H	57	6.2
	W D COWLS INC	H	58	16.8
	W D COWLS INC	H	59	2.4
	W D COWLS INC	H	60	19
	W D COWLS INC	H	145	1
	W D COWLS INC	H	146	1
	W D COWLS INC	H	147	1
	W D COWLS INC	H	148	1
	W D COWLS INC	H	149	1
	W D COWLS INC	H	150	1
	DALE BRIAN J. & PATRICIA M.	K	8	1.8
	DALE BRIAN J	K	9	16.3
	TEMENOS INC	K	17	22
	TEMENOS INC	K	18	46
	LEVINGER GEORGE K	K	27	77.3
	DALE BRIAN J	K	36	1.9
	DALE BRIAN J	K	119	1.2
	PERRY ANNETTE	L	16	74
	W D COWLS INC	L	20	25
	W D COWLS INC	L	21	13.5
	W D COWLS INC	L	22	13.3
	VOGES FORREST	M	20	19
	SMITH MIRANDA K	M	80	13
	W D COWLS INC	N	34	12
	W D COWLS INC	O	6	54.1
	W D COWLS INC	O	8	6.7
	W D COWLS INC	O	9	7.5
	W D COWLS INC	O	10	5
	W D COWLS INC	O	11	52.1
	W D COWLS INC	O	12	68.7
	W D COWLS INC	O	13	26

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61 (Continued)	W D COWLS INC	O	14	18
	W D COWLS INC	O	15	22
	W D COWLS INC	O	16	3.3
	SPRINGER ALBERT E	O	18, 113	107.8
	WATERMAN EARL A	O	21	27
	W D COWLS INC	O	23	16
	SPRINGER ALBERT E	O	84	1.5
	W D COWLS INC	O	101	1
	W D COWLS INC	O	103	1
	W D COWLS INC	O	104	1
	W D COWLS INC	O	105	1
	W D COWLS INC	O	106	1
	W D COWLS INC	O	107	1
	W D COWLS INC	O	108	1
	W D COWLS INC	O	109	1
	LAUDER DAVID M	O	118	84
	ASHCRAFT BARR	P	2	14
	POTYRALA CHESTER P	P	3	48
	W D COWLS INC	P	7	55
	W D COWLS INC	P	9	7.1
	W D COWLS INC	P	12	7.4
	GJELTEMA ROLAND W AS TRUSTEE	P	13	80
	KENERSON LAUREY C	P	37	7
	KENERSON LAUREY C	P	38	14
	W D COWLS INC	P	69	1
	W D COWLS INC	P	70	1
	W D COWLS INC	Q	6	61
	MARGLIN STEPHEN	Q	11	12
	W D COWLS INC	Q	12	38.4
	W D COWLS INC	Q	17	10.1
	W D COWLS INC	Q	23	70.7
	W D COWLS INC	Q	25	23.6
	W D COWLS INC	Q	29	11.6
	MARGLIN STEPHEN	Q	51	14
	HANKOWSKI MARY	Q	70	21
	MCLEAN DANIEL G	R	3, 4, 25	37.5
	WEILERSTEIN PHILIP J	R	7	0.6
	WEILERSTEIN PHILIP J	R	26	2.1
	W D COWLS INC	R	27	1
	FOSTER WINTHROP JR	S	1	17
	FOSTER WINTHROP JR	S	3	42
	PLAZA ALPHONSE & RITA	S	36	10

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61 (Continued)	W D COWLS INC	T	2	5.4
	W D COWLS INC	T	5	16.3
	W D COWLS INC	T	7	23
	GAGE ROBERT W	T	8	12
	W D COWLS INC	T	9	21.9
	W D COWLS INC	T	10	0.6
	W D COWLS INC	T	13	12.4
	W D COWLS INC	T	15	111
	W D COWLS INC	T	16	188.9
	W D COWLS INC	T	23	11
	W D COWLS INC	T	24	13.1
	W D COWLS INC	T	26	26.3
	W D COWLS INC	T	27	12.9
	W D COWLS INC	T	28	13.6
	W D COWLS INC	T	29	22.5
	W D COWLS INC	T	30	29.8
	W D COWLS INC	T	31	55.9
	W D COWLS INC	T	32	25
	ROY JEFFREY J	T	34	17
	W D COWLS INC	T	35	16.6
	W D COWLS INC	T	49	17.1
	W D COWLS INC	T	50	25.2
	W D COWLS INC	T	51	9.4
	W D COWLS INC	T	52	17.9
	W D COWLS INC	T	53	11.8
	W D COWLS INC	T	55	13
	W D COWLS INC	T	56	9.5
	W D COWLS INC	T	57	11
	W D COWLS INC	T	58	10
	W D COWLS INC	T	103	23.2
	W D COWLS INC	T	142	2
	W D COWLS INC	T	143	1
	W D COWLS INC	T	144	1
	W D COWLS INC	T	145	1
	W D COWLS INC	T	146	1
	W D COWLS INC	T	147	1
	W D COWLS INC	T	148	1
	W D COWLS INC	T	149	1
	W D COWLS INC	T	152	1
	W D COWLS INC	T	153	1
	W D COWLS INC	T	154	1
	W D COWLS INC	U	2	8.3
	W D COWLS INC	U	4	131.9

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61 (Continued)	W D COWLS INC	U	11	5.1
	HOUSTON THOMAS F	U	17	3
	BANFIELD-WEIR K & C	V	1	1
	STERN FAMILY ROVOCABLE TRUST	V	6	23
	W D COWLS INC	W	6	21.8
	W D COWLS INC	W	21	6.2
	W D COWLS INC	W	22	3.2
	W D COWLS INC	W	23	25.4
	W D COWLS INC	W	24	6.8
	W D COWLS INC	W	25	10.9
	W D COWLS INC	W	26	22.4
	W D COWLS INC	W	27	34.6
	W D COWLS INC	W	28	41.4
	W D COWLS INC	W	34	42.9
	W D COWLS INC	W	35	6.4
	W D COWLS INC	W	36	6.2
	W D COWLS INC	W	37	15.4
	W D COWLS INC	W	38	12.6
	W D COWLS INC	W	40	8.1
	W D COWLS INC	W	41	8
	W D COWLS INC	W	42	16.9
	W D COWLS INC	W	43	31.4
	W D COWLS INC	W	44	12.2
	W D COWLS INC	W	45	7.8
	W D COWLS INC	W	48	19.6
	W D COWLS INC	W	95	1
	W D COWLS INC	W	96	1
	W D COWLS INC	W	97	1
	W D COWLS INC	W	98	1
	W D COWLS INC	W	99	1
	W D COWLS INC	W	100	1
	W D COWLS INC	W	101	1
	W D COWLS INC	W	102	1
	W D COWLS INC	W	103	1
	W D COWLS INC	X	4	0.4
	W D COWLS INC	X	5	12.6
	W D COWLS INC	X	22	0.6
TOTAL CH. 61				**5,555.89**
Chapter 61 A	HAYES RAYMOND J	H	53	68
TOTAL CH. 61A				**68**

Ownership Status	Owner	Assessors' Map #	Assessors' Lot #	Acreage
Chapter 61B	GREENBAUM HILDA TRUSTEE OF REV.	D	35	21
	CLARK THOMAS	G	18	2
	CLARK THOMAS	G	19	1
	CLARK THOMAS	G	20	1
	CLARK THOMAS	G	21	1
	CLARK THOMAS	G	22	1
	CLARK THOMAS	G	35	2
	ARMSTRONG JR RALPH J	H	4	9
	GREENBAUM HILDA B TRUSTEE OF REVOCABLE I	H	43	32
	STONE RANDALL	H	61	8
	ROSEN JEANNE (JEWELL)	H	103	14
	GREENBAUM HILDA B TRUSTEE	L	17	124
	REHORKA FRANK G	M	15	5
	REHORKA FRANK G	M	16	24
	HANSON DAVID A	Q	18	10
	GRIFFIN JENNY LOUISE	Q	28	6
	CULLEY/DINARDI REAL ESTATE TRUST	Q	68	8
	MARGLIN STEPHEN	Q	73	3
	PEARSON SANDON S.	Q	76	1.8
	PEARSON SANDON S.	R	15	34
	HAYES ROBERT B	S	6	18
	DISE SANDRA K	S	8	14
	COTE NORMAN R	T	47	37
	JACOBY DIANE	T	96	15
	HOUSTON THOMAS F	U	18	3
	HOUSTON THOMAS F	U	45	2
	CONWAY DOLORES M	W	16	3
	CONWAY DOLORES M	W	17	2
	CONWAY DOLORES M	W	18	2
	CONWAY DOLORES M	W	19	0.4
	CONWAY DOLORES M	W	20	42
	DEVINE JOHN E	W	30	11
TOTAL CH. 61 B				**457.2**
TOTAL CHAPTER 61				**6,081.1**

Source: Town of Shutesbury Assessors Records; 2003.

Recommendations

- **The Select Board and the Board of Assessors should support the Assessor's Clerk to continue to correct and update the Assessor's Geographic Information System (GIS) parcel information so that accurate maps can be created, which would help the town most effectively implement its natural resource protection and land conservation objectives.** Over the past several

years, town officials and concerned citizens have sought to develop accurate open space maps that identify parcels of land by their degree of protection from development. The main stumbling block to these efforts has been the state of the assessor's information. In particular, the use of 'Z-lots' as a means of clumping parcels under a single ownership and the lack of a hard copy file for recent real estate transactions has made it nearly impossible to accurately depict those lands currently in the Chapter 61 tax abatement programs despite the extensive work of volunteers.

- **Explore working with a professional planner to support the Conservation Commission and Planning Board when a specific need has been identified.** The Planning Board and Conservation Commission are run by volunteers without the assistance of a professional planner. A planner would be able to provide weekly assistance to the town's boards and commissions to more effectively administer existing bylaws, implement short and long-range plans, and ensure that the towns' objectives are met relating to land use, housing, natural resource conservation, economic development, recreation, and municipal services.

- **Determine the feasibility of acquiring town land and/or adopting an aquifer protection overlay district to conserve potential sources of community drinking water supplies in Shutesbury.** According to the Executive Office of Environmental Affairs, there are potential medium yield aquifers in Shutesbury, which could be accessed via a community drinking water supply well. There are three areas in town where a community well might be feasible. All three sites have two things in common: 1) a potential medium yield aquifer below ground; and 2) a lack of constraints to locating a Zone I wellhead protection area as identified by the Department of Environmental Protection. A Zone I wellhead protection area is a circle of land around the well with a radius up to 400 feet (11.54 acres) designed to help protect the well from contamination. The three areas include: The Roaring Brook aquifer north of Leverett Road, which may already be accessed by the Shutesbury Elementary School's wells; the Dudleyville Marsh aquifer; and, the Lake Wyola/Ames Pond aquifer. Shutesbury could identify a future well site through pumping tests and surficial geology studies and if successful, acquire the fee interest of the Zone I wellhead protection area. The town may also determine that an aquifer protection overlay (APO) district would be more appropriate, though this would likely require additional pump tests to determine the extent of a well's recharge area, the most compelling boundary for such a district. An APO district would be designed to regulate land uses to reduce the risk of groundwater contamination.

- **The Board of Health should continue to map the locations of private wells in relation to road right-of-ways, leach fields, and other potential sources of**

water contamination as a means of drawing attention to the relative vulnerability of our private wells to pollutants. Groundwater is the source of drinking water for every resident in town. Typically, wells are drilled a safe distance from septic system leach fields. However, there are other types of pollutants that can contaminate private wells including petroleum products, pesticides, animal feces, and road salt. By mapping private wells using GPS and the town's GIS maps, town officials may be able to encourage a town-wide dialogue on private well water protection, the best ways of using and disposing of household hazardous wastes including gasoline and motor oil, and on regulating the town's use of road salt and deicing materials to reduce potential impacts on well water quality.

- **Encourage the Shutesbury Conservation Commission to work in cooperation with the Board of Health to ensure that rivers, streams, lakes and ponds not under the direct authority of the Amherst Public Works Department and the Department of Conservation and Recreation (Division of Water Supply Protection) are monitored for water quality.** The town could work in cooperation with the Town of Leverett and the Natural Resources Conservation Service (NRCS) to monitor rivers and streams in the Roaring Brook and Sawmill River sub-watersheds.

- **Support the Conservation Commission to continue to proactively negotiate land protection in Shutesbury and to use the publicity of projects to promote and build the Conservation Trust Fund.** Town officials have successfully protected conservation lands in Shutesbury using different methods from working in partnership with state agencies to raising funds with private donations. Often people are more apt to donate money to protect land when development is a real and impending threat. However, the ability of the town to implement its conservation objectives is maximized if funding is already available to leverage land protection deals in a timely manner. It is therefore important for officials and concerned residents to work together to increase funds available for land protection in advance of need.

- **The Recreation and Open Space Committee should continue to apply identified criteria/priorities of open space acquisition to opportunities that may arise, especially via the Chapter 61 right-of-first-refusal, so as to provide the town a rating of the parcel's relative desirability of protection.** These include:

    1. Open fields and non-forested lands;
    2. Important water features including falls, springs, and distinctive or unique wetlands;
    3. Rare species habitat (state-listed rare, threatened and endangered) and vernal pools;

4. Areas of high visual or aesthetic value;
5. Recreational access and lake, stream and trail node access;
6. Unique or distinctive historic, archaeological or geological features;
7. Threat of development; and
8. Areas that connect or enlarge protected areas and or create conservation corridors.

- **The Recreation and Open Space Committee should encourage private efforts and investment in land protection, especially when the land in question can be characterized as meeting the open space acquisition criteria listed above.** Most residents favor land protection efforts in town. According to the 2000 Town Survey, 93 percent of respondents said they *strongly supported* or *supported* acceptance of gifts to the town of conservation land and 83 percent *strongly supported* or *supported* the town purchase of conservation land. Two methods that might increase interest in land and conservation restriction donations include celebrating existing town conservation lands and educating the general public through the town web site and the Our Town newsletter on land conservation and estate planning methods, practices, and case studies. Landowners may be more apt to donate land to the town if they have confidence that the gift will be appreciated and well used. Often, case studies can be a powerful method for clearly showing the financial benefits of land protection for private landowners.

- **The Planning Board, in collaboration with the Conservation Commission, Recreation and Open Space Committee and the Board of Health, should establish a rural conservation overlay district for critical resource areas, which would have conservation development design as the preferred development option.** Utilize updated existing GIS information, the 2000 Town Survey results, the town's land acquisition criteria, and the Land Use Suitability Map (*to be created for the Land Use & Zoning Chapter of the Master Plan*) to identify the areas of town containing the greatest concentration of critical natural and recreational resources the values of which would be most greatly impacted by traditional subdivision design.

- **The Shutesbury Recreation and Open Space Committee should continue to plan, develop, and maintain trail linkages over land and water to enhance the recreational experiences of residents.** The Committee could organize a task force of stakeholders representing diverse user groups to reach consensus on trail use and promotion throughout town.

- **The Shutesbury Recreation and Open Space Committee should continue to provide information on Chapter 61, conservation restrictions, and other land protection methods to all landowners especially those with parcels in critical resource areas** (*see the Land Use Suitability Map in the Housing Chapter*)**.** The Town Survey demonstrated a strong interest among residents in land protection.

Town officials should work together to develop and fund effective means for communicating information to the people who can use it most, landowners interested in protecting their forests and fields in perpetuity.

- **The Shutesbury Recreation and Open Space Committee should continue to promote open fields for scenic and wildlife habitat purposes through educational offerings to landowners and residents.** The Committee could offer educational materials through the Our Town Newsletter concerning methods and sources of assistance for the protection, enhancement, and management of open fields.

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