SHUTESBURY
OPEN SPACE AND RECREATION PLAN

2022 – 2029

DRAFT

Prepared by the Shutesbury Open Space Committee with assistance from the Franklin Regional Council of Governments

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TOWN OF SHUTESBURY

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2022 – 2029

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Cover Image Credit: Jamie Malcolm-Brown

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SECTION 1

PLAN SUMMARY

The Shutesbury Open Space and Recreation Plan (OSRP) coalesces the interest, effort, and motivation of community members to identify, prioritize, improve, and protect Shutesbury's natural, recreational, and cultural resources. The purpose of the OSRP is to provide a framework for land use decisions and community planning efforts that affect valuable natural resources and the lands that contain unique natural, agricultural, recreational, historic, and scenic value.

The 2022 OSRP reflects the high regard Shutesbury residents have for the forests, streams, wetlands, clean drinking water, agriculture, scenic views, and significant historic and cultural resources that make the town unique. The OSRP illustrates the role that all undeveloped open spaces have in providing livelihoods, clean water, recreational resources, wildlife habitat, and climate mitigation and adaptation. The plan demonstrates how land use regulations and decisions that maximize open space and preserve natural resources protect both ecological health and community well-being. The plan also illustrates how appropriate economic development strategies can help maintain the characteristics of the town that its residents cherish.

The Seven-Year Action Plan gives concrete substance to the plan's goals and objectives, which were developed from the results of the 2021 Open Space and Recreation Plan survey and verified through public forum and comment period. The 2022 Shutesbury Open Space and Recreation Plan prioritizes actions that will help ensure that the Town of Shutesbury meets the following goals:

A. Protect Shutesbury's natural resources — clean air, clean water, large forest blocks

B. Build and enhance community in Shutesbury

C. Enhance recreation opportunities in Shutesbury

D. Create the organizational framework for achieving goals of the Open Space & Recreation Plan

SECTION 2

INTRODUCTION

A. STATEMENT OF PURPOSE

The purpose of this plan is to provide an accurate and thorough basis for decision-making involving the current and future open space and recreation needs of the residents of Shutesbury. This plan brings together and builds upon the planning efforts of the past several decades, and includes the 2012 Open Space and Recreation Plan (OSRP), the 2020 Municipal Vulnerability Preparedness community workshops and plan, the 2021 Hazard Mitigation Plan, the 2021 Open Space and Recreation Plan survey.

While the 2022 OSRP is largely based on the 2012 plan, it has been revised and updated to reflect current thinking and consensus in town on the most important recreation and natural resource needs and the best solutions for addressing them. The collective knowledge of the Open Space Committee (the Committee) members, Town of Shutesbury committee and board members, and residents has produced an updated OSRP that embodies the community's commitment to protecting and enhancing its recreational, scenic, cultural, historical, and natural resources while encouraging appropriate economic activity. The detailed Seven-Year Action Plan provides a step-by-step guide that, when carried out by the Committee and other Town boards and commissions, will further the realization of the community's goals and objectives for open space and recreation.

B. PLANNING PROCESS AND PUBLIC PARTICIPATION

The process to update the 2015 Shutesbury Open Space and Recreation Plan officially began with the first public Committee meeting on November 13, 2020. Over the following 15 months, the Committee met nine times to review sections of the plan and maps, to develop a public survey, and to plan a public forum. Staff from the Franklin Regional Council of Governments provided technical assistance. The agendas and sign-ins for each of these meetings are included as *Appendix D*. Franklin Regional Council of Governments (FRCOG) staff worked with Committee members on updating town-specific information. Committee members reviewed each of the plan chapters before they were posted for public review. Members of the Committee also represented the Conservation Commission, Recycling Committee, Old Town Beach Committee, and Web Committee.

A widely publicized survey was used to develop Sections 6 thru 9 of this plan. Because Shutesbury does not have any Environmental Justice populations or a significant population

of non-English speaking residents, the survey and outreach materials were not translated and enhanced outreach was not conducted. The survey and a summary of the survey results (186 completed surveys) are included as *Appendix D*.

An Open Space and Recreation Plan Public Forum was held virtually on Thursday, December 16, 2021. XX residents attended in addition to the Open Space Committee members present. The forum was publicized on the Town website, via the town e-newsletter and the Greenfield Recorder, and Open Space Committee members disseminated an announcement through their networks via email. A copy of the flyer advertising the Public Forum and the sign-in sheet and PowerPoint presentation given at the forum are included as *Appendix E*. Draft copies of the 2022 Shutesbury Open Space and Recreation Plan, maps, and Seven Year Action Plan were posted on the Town's website from December 9th thru 23rd for public review and comment. Comments expressed at the public forum were recorded and are detailed in *Section 10: Public Comments*. After review and discussion by the Open Space Plan Committee, all relevant ideas, comments, and corrections received during the public forum and comment period pertaining to the different sections of the plan, maps and the action steps were included in the final version of the 2022 Shutesbury Open Space and Recreation Plan.

Shutesbury Center (Jamie Malcolm-Brown)

SECTION 3

COMMUNITY SETTING

The information provided in this section, *Community Setting*, inventories and assesses the human and land use components of the landscape, moving from the present, to the past, and then to the potential future based on current development trends. The *Regional Context* gives a snapshot of Shutesbury and identifies the ways in which the location of the town within the region has affected its growth and quality of open space and recreational resources. *History of the Community* looks back at the manner in which human inhabitants settled and developed the landscape. Using statistical information and analysis, *Population Characteristics* shows the reader who the people of Shutesbury are today and how population and economic trends may affect the town in the future. Finally, *Growth and Development Patterns* describes how the Town of Shutesbury has developed over time and potential impacts that current land use controls and open space planning efforts could have on forests and other undeveloped open space, recreation areas, Lake Wyola, wildlife, drinking water supplies, and municipal services.

A. REGIONAL CONTEXT

Located in Western Massachusetts, Shutesbury is one of the rural upland hill towns on the eastern flank of the Connecticut River Valley. The town is situated in the southeast corner of Franklin County, about 85 miles west of Boston and 36 miles northeast of Springfield. It borders the rural towns of Pelham to the south, New Salem to the east, Wendell to the north, and Leverett to the west (see *Regional Context Map* at the end of this section). The more populous college town of Amherst, located in Hampshire County, borders Shutesbury's southwest corner. Amherst and neighboring towns in the central Connecticut River Valley are referred to as the Five-College Area because of the University of Massachusetts Amherst and four other liberal arts colleges located there.

Shutesbury's hilly topography is mostly forested, with numerous brooks, and scattered ponds and wetlands. Lake Wyola and the developed village area around it lies along Shutesbury's north border. The Quabbin Reservoir borders Shutesbury along approximately 2.5 miles of Shutesbury's eastern boundary. Town Center is located close to the geographic center of Shutesbury and at a significantly higher elevation than surrounding towns. Shutesbury's elevation — 1,225 feet at the benchmark in the center of town and 1,305 feet at the highest point — distinguishes it as an insular area of steep terrain when compared with many of the immediately surrounding towns. The town stretches 6 miles from north to south and the same distance from east to west at its widest point to encompass a total of 27 square miles, or 17,408 acres.

Lake Wyola (Susan Loring-Wells)

Similar to other towns in Western Massachusetts, Shutesbury has witnessed conversion from a largely agrarian economy and community to a primarily residential community whose residents commute elsewhere for their livelihood. Due to the proximity of colleges and universities in the region, much of the population growth that has occurred in the past 50 years has resulted from an influx of young professionals employed by these institutions or affiliated industries. Full buildout of a fiber-optic network in 2019 now provides high-speed internet that allows Shutesbury residents to telecommute for work or run businesses out of their homes. The vast majority of those living in Shutesbury are first generation residents.

As a bedroom community for employment centers to the west, Shutesbury has few commercial necessities for residents and is not a destination town. Residents generally travel for shopping and health care appointments. Once they have completed elementary school, Shutesbury middle and high school students attend the regional schools located in Amherst. Residents of other towns in the region visit primarily for open space and water-based recreation, such as the popular state park beach at Lake Wyola, the Temenos Retreat Center, the Morse Hill Outdoor Education Center, and the Quabbin Reservoir. Generally, Shutesbury's distance from major employment centers and highways, and lack of regional destinations, has limited growth and preserved the town's rural landscape.

A.1 Regional Natural Resource Context

As a predominantly forested town with variable topography and relatively healthy, intact stream systems, Shutesbury constitutes a very important component of a regional network of forest habitat. In Shutesbury, about 90 percent of the town acreage is forest (15,600 acres) and an estimated 12,000 acres of that forest is protected. The eastern half of Shutesbury is steep and very sparsely developed, containing largely forested lands owned by the Department of Conservation and Recreation (DCR)-owned Quabbin Reservoir Watershed and the Shutesbury State Forest. The western half is also heavily forested but have fewer parcels in permanent protection. Much of Shutesbury's protected and unprotected forested parcels extend beyond town boundaries. This not only enhances forests' conservation value and buffers from degradation, but land use decisions in Shutesbury impact forests throughout the region and vice versa.

Much of the large forest blocks north of town are also permanently protected, making Shutesbury's protected forestland part of an unofficial regional greenway, with a network of permanently protected open space that stretches northwest from the 60,000-acre Quabbin Reservation through New Salem, Shutesbury, Wendell, western Orange, and into Warwick. Within this open-space network there are eleven state forests or reservations popular for activities such as camping, fishing, hiking, and swimming.

Shutesbury's water resources are deeply interconnected with the water resources of both the region and the state. The high elevation point in Shutesbury, located near the geographic center of town, divides Shutesbury into the Connecticut River Watershed to the east and the Chicopee River Watershed to the west (see *Water Resources Map* at the end of Section 4).. Large areas of town are therefore owned and maintained as protected watersheds by the Division of Water Supply Protection of the Massachusetts Department of Conservation and Recreation (DCR), as well as by the Town of Amherst. Although portions of town are not regulated as public drinking water supply, land use decisions in Shutesbury must be sensitive to potential impacts on groundwater supply in adjacent towns that rely predominantly on private wells.

Both forested and non-forested wetlands exist along Shutesbury's rivers, streams, lakes, and ponds. These wetlands provide flood control and prevent storm damage, filter pollutants to protect surface and groundwater supplies, and provide wildlife and fisheries habitat. The majority of wetlands in town are forested. Both the Quabbin and Lake Wyola offer a regional resource for wildlife habitat and water-based recreation. Thanks to their enormous size and the state's low-impact management practices, the Quabbin Reservoir and surrounding Quabbin Reservation offer unparalleled scenic and recreation opportunities while supporting natural ecosystems. Lake Wyola, by comparison, is heavily developed and used as a recreational resource.

Few farms remain in Shutesbury today. Generally, Shutesbury soils do not support agricultural use, as over 80 percent of soils are classified as Prime I, II, or III Forestland Soils. A number of small vegetable and livestock operations do exist, including the Poverty Mountain Farm in southwest Shutesbury that is permanently protected under the Agricultural Preservation Restriction (APR) Program.

In 2014, the Harvard Forest published *Changes to the Land: Four Scenarios for the Future of the Massachusetts Landscape,*[1] an evaluation of the consequences of four different trajectories for how land use could change in the state over the next 50 years, with a specific focus on the impacts to the region's forests. The scenarios reflect different amounts and intensities of land development, timber harvesting, farmland expansion, and forest conservation. Key findings from the study show that the "Forest as Infrastructure" scenario ranked first in terms of benefits to people and nature, due to the strategies of more target conservation, smart growth development, and sustainable forestry (cutting practices that preserve critical forest benefits while maintaining local wood production). Within the "Forest as Infrastructure" scenario, the majority of new development would be clustered and concentrated near existing cities and towns to minimize forest loss and reduce the impact of growth on water resources and forest habitat. The report also emphasizes how local land use decisions can greatly influence the ability of the state's forests to offset greenhouse gas emissions and moderate the effects of climate change. The overarching policy implications from the study show that there is much to gain in conserving forests by:

- Recommitting to land conservation;
- Redoubling land use policy and Smart-Growth efforts[2] through local and state zoning reform that supports transit-friendly, walkable communities where new growth uses land efficiently and limits impacts on natural resources; and
- Promoting sustainable forestry in the Commonwealth.

In 2017, Harvard Forest published an update to their vision for the protection of the Massachusetts landscape titled *Wildlands and Woodlands, Farmlands and Communities: Broadening the Vision for New England*. The vision reaffirms the basic goal of protecting 70 percent of the New England landscape as forest and 7 percent of the New England landscape in farmland by 2060: "slowing and shifting development in a way that maintains the connection between communities and the land that sustains them."[3] The vision would manage most of the forest as woodlands for wood products and other benefits, and 10 percent as wildland reserves.

About 77 percent of Shutesbury's land area is under some form of protection. However, much more of Shutesbury's abundant forestland and limited farmland can still be protected in line with the *Wildlands and Woodlands, Farmlands and Communities Vision*. Given that much of the Commonwealth's cities and towns have been developed beyond what is outlined by the Vision, rural towns like Shutesbury play a critical role, in the regional context, in ensuring adequate land protection to preserve wildlife habitat, protect water supply and quality, and offset greenhouse gas emissions to maximize benefit to people and nature.

[1] http://harvardforest.fas.harvard.edu/changes-to-the-land

[2] To learn more about Smart Growth, see the Massachusetts Executive Office of Energy and Environmental Affairs' Smart Growth/Smart Energy Toolkit at http://www.mass.gov/envir/smart_growth_toolkit/.

[3] https://harvardforest.fas.harvard.edu/other-tags/wildlands-woodlands

A.2 Regional Planning Context

Because undeveloped natural resources, migrating species, and water are not bounded by town borders, critical resources can be fully protected only by conserving and stewarding networks of land that cross town and state boundaries. A number of ongoing regional conservation partnerships and planning efforts that include Shutesbury aim to optimize natural resource and recreation planning at the watershed and regional scale. This section reviews recent regional projects involving Shutesbury that have implications for open space and recreation planning.

The Franklin Regional Council of Governments (FRCOG) provides regional planning and purchasing services for member towns, of which Shutesbury is one. Regional priorities identified for Franklin County include water quality protection, climate change resiliency, affordable housing, sustainable land use, and economic development. In 2013, the FRCOG assisted the Sustainable Communities Consortium[4] in completing the *Sustainable Franklin County: Franklin County's Regional Plan for Sustainable Development* (RPSD).[5] The RPSD is a long-term guide for Franklin County municipal governments, regional organizations, businesses, non-profits, and individuals. Through extensive public participation, individual residents and representatives of many organizations contributed to the creation of the plan. The plan identifies issues, constraints, and goals with recommendations and strategies in seven subject areas: housing, transportation, economic development, energy, natural resources, cultural resources, and land use and infrastructure. The overall sustainable development goals that came out of the public participation process are as follows:

- Increase and improve the housing stock, while focusing on affordability;
- Provide additional options for alternative transportation;
- Encourage economic development, by redeveloping vacant sites;
- Promote energy conservation and efficiency;
- Protect natural resources, including farmland and drinking water supplies;
- Foster the growth of arts and culture;
- Concentrate new growth near town centers and focus on infill development; and
- Improve infrastructure, particularly high-speed internet.

The plan notes that the predominant residential development patterns in the county are converting farms and forests to residential lots and fragmenting the remaining farmland and forestland. The Approval Not Required (ANR) provision of the Subdivision Control Law allows for residential development along existing roads without Planning Board approval when frontage and lot size requirements are met. Combined with zoning in many towns that can require anywhere from one to four acres of land per home, the result is continual residential development spaced along town roadways, away from town centers. New subdivisions, while much less common than ANR development, are sometimes located outside of existing town centers, further fragmenting the land and converting green spaces to development. Recently, solar development

[4] The Sustainable Communities Consortium included Community Action, Franklin County Regional Housing and Redevelopment Authority, North Quabbin Community Coalition, Franklin County Community Development Corporation, and the Towns of Greenfield, Deerfield, Montague, and Orange.

[5] https://frcog.org/program-services/land use-planning-zoning/sustainable-franklin-county-2013-plan/

has, in many communities, taken the place of residential development as the dominant driver of forest fragmentation.

The Franklin County Farm and Food System Project[6] identifies the ways Franklin County stakeholders could increase food production, a vital need demonstrated in the assessment of regional food insecurity and in the Food Solutions New England's 50-by-60 Vision (in which New England produces 50 percent of its food by 2060). The project identifies opportunities to increase farmland on the edges where existing farmland meets forest and to connect farmland owners to aspiring farmers.

State agencies — primarily the Department of Conservation and Recreation (DCR) and Division of Fisheries and Wildlife (MassWildlife) — protect and manage conservation land in Shutesbury. Three land trusts and a regional conservation partnership include Shutesbury in their service areas. Kestrel Land Trust serves as the regional land trust for Shutesbury and neighboring towns to the south and west. Kestrel works with individuals and communities to conserve and care for land, including building regional trail networks linking communities. Kestrel focuses on forests connecting to the Quabbin Reservoir, among other areas, and played a major part in permanently protecting the Paul C. Jones[7] and Walter C. Jones Working Forests. The Franklin Land Trust also serves Shutesbury and towns north and east.[8]

Mount Grace Land Trust serves as the regional land trust for towns on Shutesbury's northern boundary and participates in the North Quabbin Regional Landscape Partnership (NQRLP), a voluntary association of public and private groups focused on conserving rural land in Mount Grace's service region as well as the towns of Pelham, Shutesbury, and Leverett.[9] The NQRLP focuses on increasing the pace and scale of land conservation and stewardship through landowner outreach, municipal capacity-building, landscape-scale conservation projects, and strategic mapping.

In addition to efforts in regional open space planning undertaken by agencies and non-profits, collaboration can happen between town governments. Many of Shutesbury's neighbors, including Wendell and Pelham, include in their OSRPs actions relating to regional cooperation and collaboration on resource protection and recreation. Keeping neighboring towns informed of issues impacting the watershed or regional conservation or recreation projects can be important for addressing regional problems.

[6] https://frcog.org/wp-content/uploads/2015/10/FRCOG-FC-Farm-and-Food-System-Project-Final-Report-093015.pdf

[7] The largest conservation restriction on privately owned land in Massachusetts: https://www.kestreltrust.org/places/paul-c-jones-working-forest/

[8] http://www.franklinlandtrust.org/

[9] https://www.mountgrace.org/initiatives/nqrlp

A.3 Regional Recreation Planning

In 2017, the state published the State Comprehensive Outdoor Recreation Plan (SCORP), "a planning document that discusses the available recreational resources in the Commonwealth, along with the needs of its residents, and identifies the gap between them."[10] The plan identifies four primary goals for recreation and open space opportunities statewide: increased access for underserved populations, support of the statewide trail network, increased availability of water-based recreation, and support of the creation and renovation of neighborhood parks. Shutesbury has the potential to further SCORP's goals not only for local residents, but also for residents of the region and state as a whole. This plan's *Section 7: Analysis of Needs* will elaborate further on the relationship between statewide outdoor recreation goals and needs specific to Shutesbury.

A number of regional recreational initiatives include cycling routes in Shutesbury. The Franklin County Bikeway, for example, totals approximately 240 miles in length and covers the entire county with connections to bordering counties and states. Much of the Bikeway network consists of "on-road" or "shared-roadway" sections that make use of predominantly low-traffic roads. The central portion of the Bikeway is marked with Franklin County Bikeway way-finding signs. Shutesbury is part of the eastern map section.[11] The intermediate-level Shutesbury loop is 20.5 miles through three towns. These routes offer bicycling and transportation opportunities for both novice and intermediate riders.

The FRCOG partnered with the Greenfield YMCA, Baystate Franklin Medical Center, Greenfield Community College, and the Franklin County Chamber of Commerce to develop and launch *Walk Franklin County – for the Health of It!* This cooperative program works to promote walking for transportation, reduction of air pollution, and physical fitness and health. The *Walk Franklin County – for the Health of It!* project is a free program that allows participants to measure and record their walking progress and receive rewards for reaching their walking goals. The Shutesbury loop starts at a parking location on Lake Wyola, heads west on Lakeview Road, south on Wendell Road, and then loops north again on Locks Pond Road.[12]

The 215-mile New England Trail (NET) is a long-distance hiking trail between the Long Island Sound and the Massachusetts-New Hampshire border.[13] The trail traverses a total of forty-one communities in Connecticut and Massachusetts and is comprised primarily of the historic Mattabesett, Metacomet, and Monadnock (M-M-M) Trail systems. It has federal designation through the National Park Service and is managed in Massachusetts by the Appalachian Mountain Club (AMC). Sections 12, 13, and 14 of the trail pass through eastern and northern Shutesbury, primarily on logging and vehicular roads. There is a designated NET shelter approximately five miles north of Lake Wyola in the Wendell State Forest.

[10] Commonwealth of Massachusetts Department of Conservation Services. *State Comprehensive Outdoor Recreation Plan*, 2017: https://www.mass.gov/files/massachusetts-scorp-2017-for-submission.pdf

[11] Eastern Franklin County Bikeway Map: https://frcog.org/wp-content/uploads/2018/03/Eastern_sm.pdf

[12] https://frcog.org/wp-content/uploads/2018/09/Shutesbury.pdf

[13] https://newenglandtrail.org/

B. HISTORY OF THE COMMUNITY

Pre-Colonial

Prior to the 1700s, native settlement in Shutesbury was likely limited to small fishing and hunting camps along major waterbodies used by the Nipmuc, Pocumtuck, and Wabanaki Confederacy, who all shared Shutesbury as territory.[14] Importantly, trade and social relationships between the Nipmuc and Pocumtuck peoples resulted in a network of regularly used paths that crisscrossed Shutesbury and served as the basis for later roads. While Indigenous villages were often located along waterways, uplands such as Shutesbury were an integral part of the seasonal and ceremonial life.[15] During the late 1600s, Shutesbury may have gained increased importance to the Pocumtucks as a resource or a settlement area due to colonial encroachment on their traditional settlement center around present-day Old Deerfield and along the Deerfield River.

A Metropolitan District Commission historical site survey from 1994 to 1998 identified 31 historical archeological sites on the Quabbin Watershed Reservation land in Shutesbury.[16] The Massachusetts Historical Commission has identified additional sites throughout the Quabbin lands managed by the DCR Division of Water Supply Protection.[17] Artifacts have been identified that suggest the Swift River Valley was occupied by Paleo-Indian hunters and gatherers, fishermen, and farmers from between 9,500 and 12,000 years ago until 450 years ago when the colonial settlement period began.

Colonial Period

European-Americans founded the Town of Shutesbury during a period when it served as an important transportation corridor, giving it the nickname of the "Roadtown" Community. In the early eighteenth century during the state's colonial era, a petition was filed by colonists in Lancaster, Massachusetts, to the governing body of the Massachusetts Bay Colony, to gain transportation access routes to Springfield and Hartford markets for their goods. As compensation for their labor in constructing the road, the petitioners requested land.

The General Court for the Governing Body ordered a survey of a 6-square-mile tract of land along the requested route and granted the request for land, subject to the following future population, housing, agricultural and road-width requirements: (1) within 4 years, 60 families must have settled there; (2) each family must build an 18-foot square house with 7-foot high ceilings; (3) each settler must clear 4 acres for crops and 4 acres for English grass; (4) a meeting house must be built and a minister found to settle in the town; and, (5) the constructed road must be wide enough and smooth enough to be used for carts.

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[14] native-land.ca, accessed 11-6-2020

[15] Massachusetts Historical Commission. MHC Reconnaissance Survey Town Report. Commonwealth of Massachusetts, 1983: https://www.sec.state.ma.us/mhc/mhcpdf/townreports/CT-Valley/shu.pdf

[16] Shutesbury Historical Commission. *Shutesbury Master Plan Chapter 6*, 2004: https://www.shutesbury.org/sites/default/files/offices_committees/planning_board/MasterPlanSections/11%20Historic%20and%20Scenic%20Resources.pdf

[17] Massachusetts Department of Conservation and Recreation Division of Water Supply Protection Office of Watershed Management. *Quabbin Reservoir Watershed System Land Management Plan 2007 – 2017:* https://www.mass.gov/doc/dcr-watersheds-plans-quabbin-reservoir-land-management-plan-2007-2017-2/download

A final grant of the land was made to the ninety-five original petitioners on April 17, 1735 and signed into law on the subsequent day by Governor Belcher. The granted tract of land ended up being 10 miles long (north-south) and nearly 6 miles across (east-west), including a large portion of what is now Wendell and a small part of New Salem. Committees were formed to delineate lots and to clear and maintain the road. In addition to their labor, each family was required to pay three English pounds. The first lot was settled in 1739. Land was then offered for a sawmill, corn mill, gristmill, and the development of a meetinghouse. In 1761, the Town was officially incorporated as Shutesbury to honor Samuel Shute, who had been the Governor of the Massachusetts Bay Colony from 1716 to 1723.

In the period from 1723 to 1860, school districts were established (the northern end of Shutesbury was apportioned to Wendell) and land was purchased for a cemetery. The free public library was established at Town Meeting in 1894, and the M.N. Spear Memorial Library was completed in 1902, bequeathed by Mirick N. Spear. A Methodist church was built in 1851 and the Hearse House in 1858.

Throughout the 18th and 19th centuries, high-flowing streams provided power and water for a variety of small mill and farming operations. Shutesbury prospered and became considerably self-sufficient, producing its own lumber, food, clothing, shoes, and hardware. This level of economic activity continued into the 20th century, due especially to the abundant forest resources that allowed for continuous logging activities and downstream shipping. Although farming activities were minimal, staples such as corn, tobacco, and butter were produced for commercial use. Apple and pear orchards were cultivated and maintained. As logging operations cleared areas for fields, residents began haying activities and growing rye, potatoes, and oats. Sawmill operations, however, were the predominant economic activity during the 19th century, with numerous sawmills constructed on the various waterways in town, adjacent to gristmills and cider mills. In the mid-1800s, ten water-powered sawmills were producing lumber, railroad ties, shingles, barrel staves, laths, and components for chairs and other wood products.

The creation of the Quabbin Reservoir brought an immediate influx of functional, municipal capital funds, as well as major and lasting change for Shutesbury. In 1935, Town Meeting voted to "*do all things reasonable to ensure the building of a first-class connecting road between Shutesbury Centre and the Daniel Shays Highway...with no cost to the town...*" and to discontinue a total of 1,150 feet of Cornwell Road (comprising one segment on each side of the Daniel Shays Highway). Although the Town of Shutesbury was not flooded to establish the Quabbin Reservoir (in contrast to the towns of Dana, Enfield, Greenwich, and Prescott), Shutesbury did lose at least 13 homes, major farms, and mill properties. In addition, some of Shutesbury's best farming soil was in the Swift River Valley area that was purchased by Metropolitan District Commission. One can still walk the remnants of Shutesbury's decommissioned River and Enfield Roads and see foundations, wells, and other signs of abandoned homes and mill sites; even more lies below the surface of Quabbin Reservoir. The losses of many families and businesses went virtually unrecognized, overshadowed by the more dramatic losses of the four disincorporated towns. However, the Shutesbury Historical Commission recognizes the sacrifices made by Shutesbury's families, despite the infrastructure improvements and monetary gains provided by the creation of the Quabbin Reservoir.

Shutesbury also had economic opportunities from tourism, based on the discovery of mineral springs at Mount Mineral, which people seeking health treatment visited throughout the 19th century. Several hotels were built in the late 1890s, and the development of small cottages around Lake Wyola attracted people to town during the early 20th century. By 1940, more than 60 new cottages at the lake were constructed by families from Greenfield, Springfield, Chicopee, and Holyoke. These cottages, many on quarter-acre parcels or smaller, created the most densely developed part of the town.

During the 1940s and 1950s, Town Meeting approvals provided funding for the purchase of land for a new school, establishment of a Fire Department and Police Department, and in 1966, the dam and water rights were acquired for Lake Wyola. Gradual expansion of Town occurred during the last decades of the 20th century and the early decades of the 21st century with the development of additional roads and a large influx of new residents.

The Town of Shutesbury is governed by a Select Board with input from residents at Annual (representative) Town Meeting. Many dimensions of the community's long-term health, safety, and well-being are managed by committees of volunteers.

Ames Pond at Julian's Bower (Susan Loring-Wells)

C. POPULATION CHARACTERISTICS

This section, Population Characteristics, assesses Shutesbury's needs for open space and recreational resources based on an analysis of demographic, economic, and labor-force statistics. The demographic information includes changes in total population, age distribution, racial composition, and economic characteristics. The economic information describes employment available in Shutesbury and characteristics of working Shutesbury residents generally. Population characteristics thus inform decisions regarding the type, quantity, location, and level of future investments in open space and recreation areas and facilities.

C.1 Population Distribution

Many citizens of the Massachusetts Bay Colony moved to Shutesbury in the period from 1740 to the start of the American Revolution. During the period from 1765 to 1820, Shutesbury grew by 300 percent — from 339 inhabitants to more than 1,000.[18] Shutesbury's population rose to 1,029 in 1820. A subsequent population decline, resulting in only 614 residents by the 1870s, progressed well into the 20th century, and by 1940, Shutesbury's population consisted of only 191 residents.

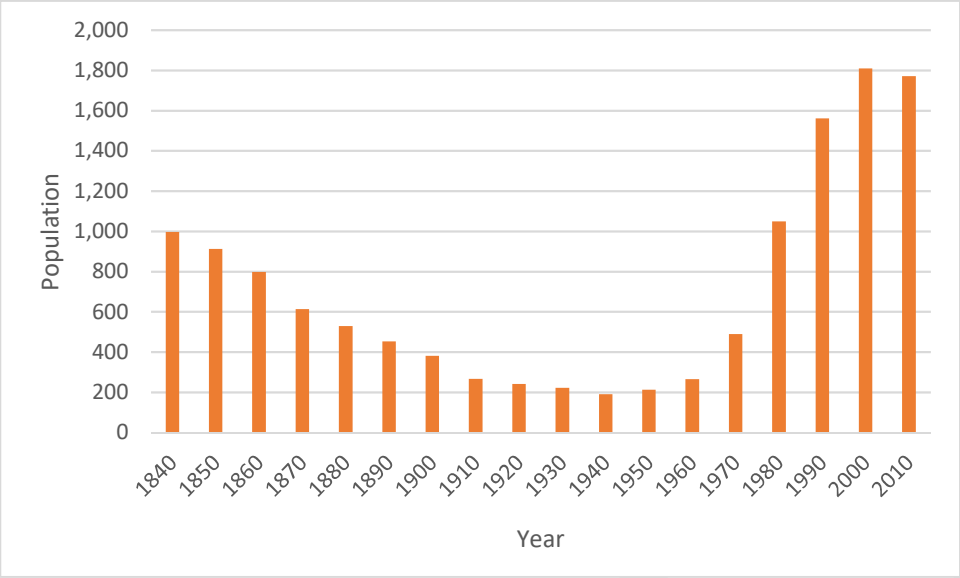
Transportation and communication developments, plus the expansion of the University of Massachusetts Amherst (originally the Massachusetts Agricultural College established in 1863), proved to be dominant socioeconomic factors both in Shutesbury's population increase during the 20th century and in that population's shift from engagement in industrial and agrarian activities to employment in education or service-related work. Shutesbury became an area from which most people commuted to work rather than a place where they worked. Shutesbury's population would remain relatively small until the 1970s, when it started to grow again well beyond the 1820 peak population (see Figure 3-1).

In the thirty years between 1970 and 2000, Shutesbury's population increased by 262 percent (489 people in 1970 to 1,810 in 2000). This growth rate exceeded that of all other towns in Franklin County over the same period, a rate of growth much higher than in Hampshire County or at the state level (see Table 3-1). The 2014 Shutesbury Master Plan credits this astronomical growth to an "in-migration of new residents seeking to experience the town's high quality of life, including its good schools, and nearby job opportunities."[19]

[18] Shutesbury Education Foundation, 2000

[19] Town of Shutesbury. *Shutesbury Master Plan*, 2014

Figure 3-1: Historical Population Figures for the Town of Shutesbury, 1840 – 2010



Source: U.S. Census Bureau

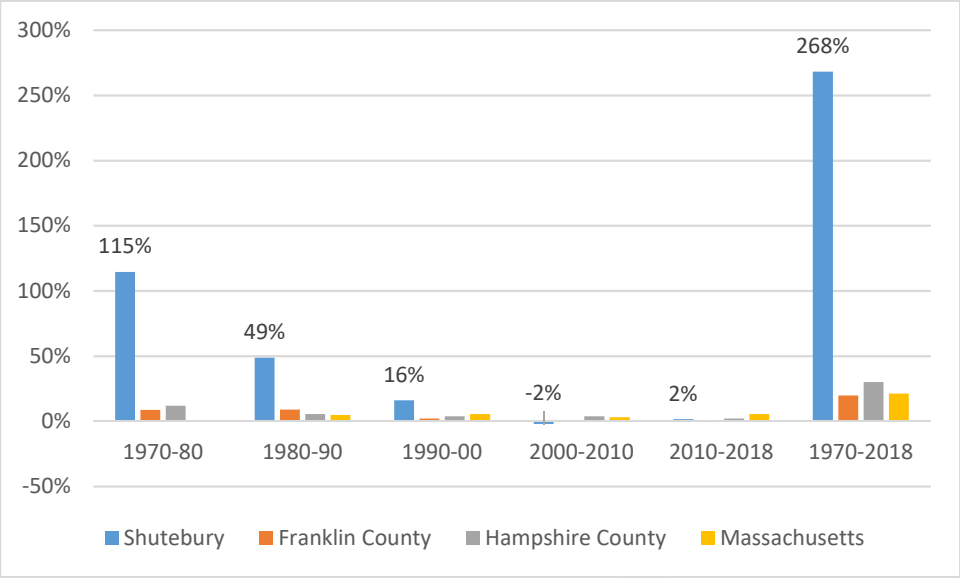
The U.S. Census Bureau's American Community Survey (ACS) Five-Year Estimates for 2018 lists an estimated population of 1,801 for Shutesbury. Between 2010 and 2018, Shutesbury's population remained nearly constant, similar to Franklin County. However, Shutesbury's population growth over the last forty years was dramatically greater than either Franklin or Hampshire Counties, or the state (see Figure 3-2).

Table 3-1: U.S. Census Population Counts, 1970, 1980, 1990, 2000, 2010, and 2018

Geography	U.S. Census Population					
	1970	1980	1990	2000	2010	2018
Shutesbury	489	1,049	1,561	1,810	1,771	1,801
Franklin County	59,223	64,317	70,092	71,535	71,372	70,935
Hampshire County	123,981	138,813	146,563	152,251	158,080	161,159
Massachusetts	5,689,377	5,737,037	6,016,425	6,349,097	6,547,629	6,902,149

Source: U.S. Census Bureau, ACS Five-Year Estimates 2018

Figure 3-2: Percent Change in Population by Decade, 1970 - 2018



Source: U.S. Census Bureau, ACS 2018

With a median age of 47.6, Shutesbury has a population slightly older than that of the county (46.1) but almost a decade older than the state (39.4) (Table 3-2). The number of people 65 to 74 years of age constituted the fastest growing age cohort between 2010 and 2018; more than doubling in size from 5.3 percent to 12.8 percent of the population. People over 75 years of age were the second fastest growing population. These increases may be partially driven by the aging of the baby-boomer generation (born 1946 to 1964), yet the population of people 45 to 64 years of age in fact declined by 7.0 percentage points to 35.4 percent of the population. The portion of people ages 25 to 44 decreased less dramatically, down 1.2 percentage points to 19.4 percent of the population. The cohort of young people in Shutesbury appears to have aged as well. The percentage of people ages 10 to 19 and 20 to 24 increased slightly to 13.4 percent and 5.3 percent, respectively. The population of children 9 years and under, however, decreased to 8.3 percent of the population. While the age distribution in Shutesbury is similar to that of Franklin County, the Shutesbury community is older than the state as a whole.

Table 3-2: Population by Age Group, 2010 and 2018

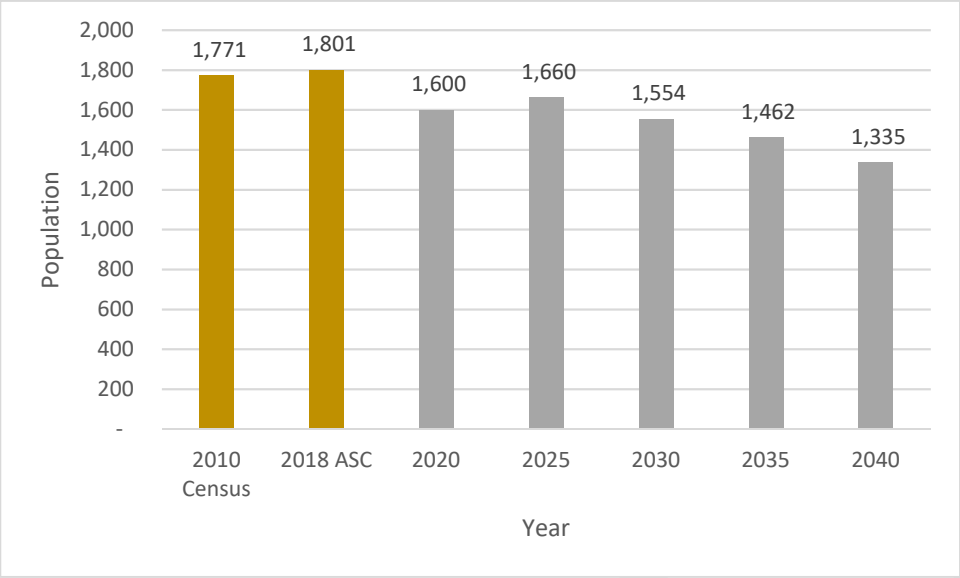
Geography	Total Population	9 Years & Under	10-19 Years	20-24 Years	25-44 Years	45-64 Years	65-74 Years	75 Years & Over
Shutesbury								
2010	1,771	11.2%	13.0%	4.1%	20.7%	42.4%	5.3%	3.3%
2018	1,801	8.3%	13.4%	5.3%	19.4%	35.4%	12.8%	5.4%
Difference	+30	-2.9%	+0.4%	+1.2%	-1.2%	-7.0%	+7.5%	+2.1%
Franklin County								
2010	71,372	10.0%	11.9%	6.0%	23.1%	33.7%	7.9%	7.3%
2018	70,935	9.0%	10.7%	5.3%	23.8%	31.0%	12.6%	7.6%
Difference	-437	-1.0%	-1.2%	-0.7%	+0.7%	-2.7%	+4.7%	+0.3%
Massachusetts								
2010	6,547,629	11.5%	13.3%	7.3%	26.5%	27.7%	7.0%	6.8%
2018	6,830,193	10.7%	12.5%	7.2%	26.3%	27.4%	9.0%	6.8%
Difference	282,564	-0.8%	-0.8%	-0.1%	-0.2%	-0.3%	+2.0%	0.0%

Source: U.S. Census Bureau 2010 and ACS 2018

In 2015, the UMass Donahue Institute began publishing population projections for all Massachusetts cities and towns up to the year 2040.[20] The estimates project a decrease in the town's population over the next 20 years, indicating that the current total population may be near a multi-decade peak (Figure 3-3). These projections do not account for potential population change driven by the Covid-19 pandemic, the installation of high-speed internet in Shutesbury, the regional housing market, the impact of climate change, or other emerging factors.

[20] UMass Donahue Institute Population Projections, vintage 2018: www.pep.donahue-institute.org

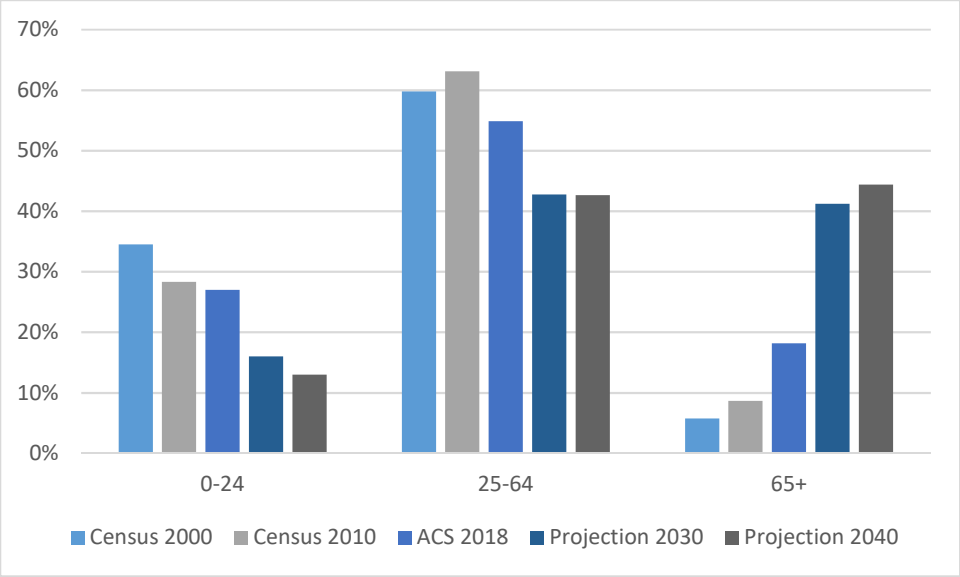
Figure 3-3: Population Projections for Shutesbury, 2020 – 2040



Source: US Census, 2000 & 2010; ACS, 2018; UMass Donahue Institute Population Projections, Vintage 2018

While the overall population numbers are not expected to change dramatically, the age make-up of the population is projected to shift significantly in the next two decades. Projections by age shown in Figure 3-4 show a large drop of 0 to 24-year-olds between 2018 and 2040 and a large increase in the 65-and-older population over the same period.

Figure 3-4: Population Projections for Shutesbury by Age Group, 2020 - 2040



Source: US Census, 2000 & 2010; ACS, 2018; UMass Donahue Institute Population Projections, Vintage 2018

Like many small towns whose demographic shifts are determined by regional social and market forces, Shutesbury has had a difficult time predicting future population changes. Projections used for the 2004 Shutesbury Master Plan and the 2000-2005 Open Space and Recreation Plan

anticipated continued population growth that would increase the population to 2,600 by the year 2025. These estimates were based on an assumption that the previous three decades of growth would continue due to anticipated future job opportunities within both Franklin and Hampshire Counties. Although the expansion of the University of Massachusetts Amherst and the development of Hampshire College in Amherst during the 1970s did result in population increases, the largest degree of development was concentrated within the southwestern portion of Shutesbury, closest to Amherst and the Town of Amherst's Atkins Reservoir surface water supply. Many factors have likely contributed to the reduction of this period's population growth from that previously forecast, including:

1) An increase in transportation costs, coupled with the lack of public transportation from Shutesbury to either the Amherst or the Greenfield area. Only 11.5 percent of Shutesbury's residents work in town (9 percent work from home and 2.5 percent commute within Shutesbury;[21]
2) Few housing vacancies for lower-income families, coupled with a large increase to the average property tax in Shutesbury;
3) A general reduction in the number of families with children entering the Town's elementary school, as the "baby-boomer" generation has aged beyond child-bearing years; and,
4) A lack of high-speed internet access and cell phone reception prior to 2020, which reduced opportunities for home-based businesses, the ability of students to obtain information required for schoolwork, and the ability of residents to telecommunicate.

The reduction in the school-aged population in Shutesbury reflects a general trend across Western Massachusetts. Numerous discussions have been ongoing both within and between many towns concerning reduced school budgets, reduced school enrollment, potential school closures, and regionalizing existing schools. Many town budgets show an increase in the per capita cost of elementary and middle school education, translating to a reduction Town funds available for other services and capital infrastructure.

Based on projections, Shutesbury can expect its population to age over the next ten years. More retirees may spend more time in outdoor recreation, such as walking, gardening, biking, hiking, and hunting and fishing. Aging populations generally favor flat and accessible trails and recreation sites. Recreation destinations would also need to be served by accessible parking, given Shutesbury residents' reliance on cars, and more facilities that are accessible to persons with disabilities. The town is fortunate to have the Carroll A. Holmes Recreation Area (a state park) at Lake Wyola, which does have accessible facilities for people with disabilities. Programming geared towards continued learning, gentle exercise, and community engagement could also serve an aging population.

At the same time, youth and other age groups will continue to need facilities and programs that can provide safe space for recreation. Shutesbury has a good quality elementary school and strong

[21] American Communities Survey 2014 – 2018 5-Year Estimates; U.S. Census Longitudinal Employer-Household Dynamics, 2017

sense of community despite recent declines in enrollment (208 students in 2000 to 124 in 2020).[22] Elementary school enrollment generally mirrors population-age trends and the town may have to provide incentives (such as continuing to update active recreation facilities) for younger homebuyers to purchase homes in Shutesbury in order to keep the school-age population stable. Although with such low-density settlement in Shutesbury it is not feasible to have recreation facilities close to every resident, good wayfinding and trail connections from more densely populated areas directly to open space and recreation facilities can be important for providing access to all generations.

C.2 Population Density

With a 2018 population of 1,801 people and an area of 27 square miles, Shutesbury has a very low population density relative to its geographic size, with 67 people per square mile or 9.6 acres per person. This is very low by state standards and reflects the rural character of the town.

Shutesbury is characterized by owner-occupied, single-family homes distributed at low density along main arteries or concentrated in the Town Center District, at the Sirius Community eco-village, and around Lake Wyola. According to the Assessor's records, there are 31 two- to four-unit homes in Shutesbury. The largest multi-unit housing or condo-style developments are at Sirius. The Town's zoning bylaws encourage concentration of residential dwellings through its Open Space Design provision, which uses flexible regulations for density and lot dimensions to encourage creativity and conservation of land in subdivision development. The provision requires new subdivisions to cluster dwelling units in order to preserve a large portion of the parcel as open space. Although zoning regulations for the Town Center district encourage mixed-use development, the opportunity for infill is limited by lack of sewer and water and other environmental constraints. New development in Shutesbury is pushed to the more rural, outlying parts of town as a consequence. For a discussion of population density in the context of environmental equity, see *Section 4.I.9 Environmental Equity*.

C.3 Economic Wealth of Residents and Community

Comparing income levels of Shutesbury's residents to those of the county and state helps assess the ability of the citizenry to pay for recreation and open space resources and programs. Table 3-3 shows income estimates for Shutesbury, Franklin County, and Massachusetts. Per capita income is determined by dividing the total amount of income earned in an area by the number of residents, including portions of the population that might not be generating income such as children and retired adults. Per capita income in 2018 was $41,094, an estimated jump of $2,733 in the five years since 2013. Shutesbury's per capita income is slightly lower than the estimate for the state ($41,794) but significantly higher than that for the county ($34,202).

Median household income is determined by calculating the income of each person ages 15 years and over in a household and then finding the midpoint of all household incomes (i.e., half of the

[22] Massachusetts Department of Elementary and Secondary Education. School and District Profiles database: https://profiles.doe.mass.edu/

household incomes are above this figure, and half are below this figure). This statistic includes all occupied households, including families and individuals living alone. Shutesbury's estimated median household income in 2018 was $83,750, higher than estimates for both the county ($59,522) and state ($77,378). Out of all 26 Franklin County towns in 2018, Shutesbury's median household income ranked as the third highest and per capita income the fifth highest, demonstrating that on average, Shutesbury residents tend to be financially better off than the county and state as a whole

Of the town's 1,794 residents for whom poverty status was determined, 9.8 percent were estimated to be living below the poverty level in 2018. This represents an increase from 8.4 percent in 2013, but remains lower than the rate at the county (10.4 percent) and state (10.8 percent) levels. Some of the town's poverty rate can be attributed to college students residing in Shutesbury.

Table 3-3: Income and Poverty Estimates, 2018

Geography	Per Capita Income Estimate	Median Household Income Estimate	Percent of Individuals Below Poverty Level*
Shutesbury	$41,094	$83,750	9.8%
Franklin County	$34,202	$59,522	10.4%
Massachusetts	$41,794	$77,378	10.8%

*For whom poverty status was determined
Source: ACS 2014-2018 Five-Year Estimate. Estimate of income for the past 12 months reported in 2018 dollars.

Ninety percent of occupied housing units in Shutesbury were owner-occupied in 2018.[23] This percentage is significantly greater than the 69 percent owner-occupancy rate for Franklin County and 62 percent for the state as a whole, suggesting that the proportion of Shutesbury residents who are able to afford their own home is larger than for the county as whole and that Shutesbury may be sought after as a place to purchase a home. The average household size for these owner-occupied units was 2.33 persons. While 2018 median home prices in Shutesbury were the seventh most expensive in the county at $286,100, they appear more affordable relative to those in the neighboring towns closer to employment centers, such as Leverett ($337,600), Amherst ($360,200) and Pelham ($326,500). Owning housing in Shutesbury may still be challenging for some due to the relatively high purchase cost of homes, rising property taxes, and transportation costs.

C.4 Employment Statistics

Employment statistics like labor force, unemployment rates, and type and place of employment are used to describe the local economy. Labor force figures can reflect the ability of a community to provide workers for incoming or existing businesses, unemployment rate can show how well residents are faring in the larger economy, and employment figures describe the number of employees in different types of businesses, which can be used to determine the types of industries

[23] American Communities Survey 2014 – 2018 5-Year Estimates

that could be encouraged in town. The community may decide to encourage business development to provide services to residents, to create more jobs, and as a way of increasing taxable property values. Increased tax revenue can help pay for municipal services and facilities, including recreational parks, programming, and open space protection.

C.4.1 Labor Force: Shutesbury Residents Who Are Able to Work

The labor force is defined as the pool of individuals who are 16 years of age and over who are either employed or who are actively seeking employment. Persons not actively seeking employment, such as some enrolled students, retirees, or stay-at-home parents, are excluded from the labor force. While Shutesbury's population has remained relatively the same over the past 20 years, the number of residents employed has grown. In 2019, the total labor force in Shutesbury was 1,135 people, the highest it has been since 2007 (see Table 3-4).

Table 3-4: Annual Labor Force and Unemployment, 2019

Geography	Labor Force	Employed Persons	Unemployed Persons	Unemployment Rate
Shutesbury	1,135	1,114	21	1.9%
Franklin County	41,318	40,207	1,111	2.7%
Massachusetts	3,817,437	3,706,556	110,881	3.7%

Source: Massachusetts Executive Office of Labor and Workforce Development, 2019

Shutesbury's unemployment rate in 2019 was 1.9 percent, a rebound from the post-recession high of 6.2 percent unemployment in 2010 and the lowest it has been since 2000. The unemployment rate is determined by dividing the number of unemployed persons in an area who are actively seeking employment (and therefore part of the labor force) by the total labor force for that area. As Figure 3-5 shows, the 1.9 percent unemployment rate is lower than that of the county and state, which in 2019 were 2.7 percent and 3.7 percent, respectively. Yet however consistently Shutesbury's unemployment rate remains below the county and state average, it is still influenced by patterns in the greater economy. The Covid-19 pandemic had a dramatic influence on employment in 2020 and 2021, pushing Shutesbury's unemployment rate to 7.2 percent in August of 2020. The full, long-term economic impacts of the pandemic on the workforce are not yet known.

Figure 3-5: Annual Unemployment Rates, 2000 – 2019
Source: Massachusetts Executive Office of Labor and Workforce Development, 2019

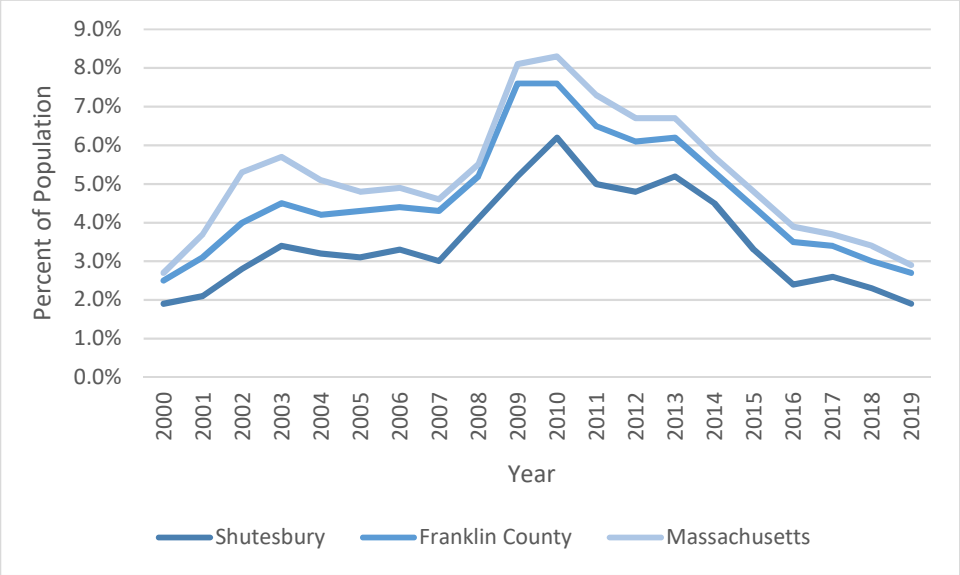
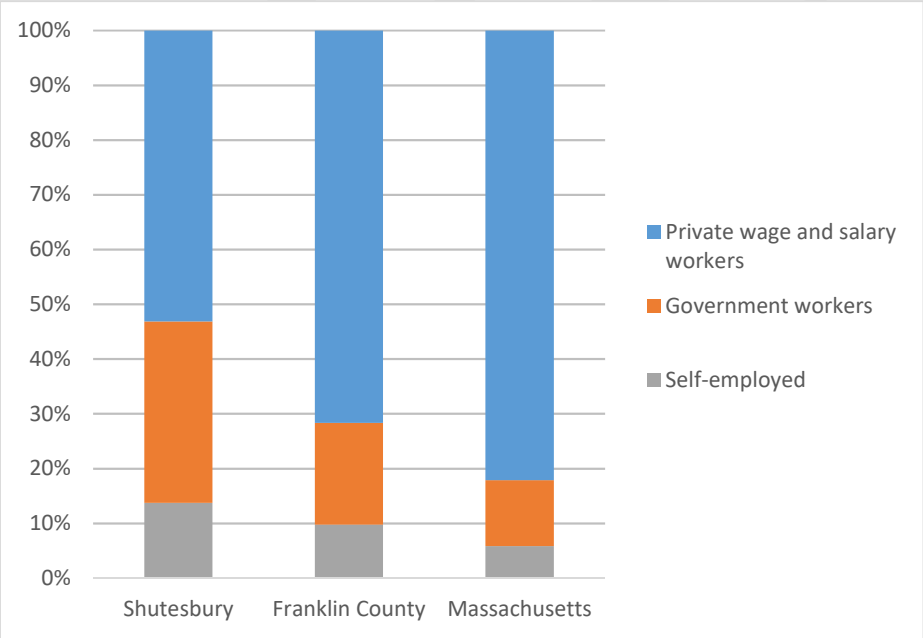


Figure 3-6 shows the class of worker for the civilian employed population aged 16 years and over, demonstrating that Shutesbury has more self-employed workers (14 percent of the working population) than Franklin County or Massachusetts as a whole. These self-employed residents likely represent a large portion of the residents who work from home.

Figure 3-6: Shutesbury Resident Employment by Class of Worker, 2018



Source: 2014-2018 ACS 5-Year Estimates

C.4.2 Industry Sectors and Employment

An important element of the employment profile is the type of work done by residents. This section reviews employment trends by industry sectors and occupations as well as the type of employer (such as a private or government employers, or self-employed workers) of Shutesbury residents. The Census Bureau has identified thirteen distinct employment sectors that represent different economic industries, such as manufacturing or retail trade. Occupation data relates to the employment of Shutesbury residents, regardless of where they may be employed.

Table 3-5 presents estimates of the percentage of Shutesbury residents employed in different industries, as compared to the county and state. Approximately half (49.2 percent) of town residents are employed in educational services and health care and social assistance, a rate significantly higher than the county and state rates, and similar to the 2000 rate (46 percent). The next highest employment sector among residents is professional, scientific, and management, and administrative and waste management services (10.8 percent). A higher percentage of Shutesbury residents than the rest of the county or state are also in the information and public administration industries.

Table 3-5: Industries in which Shutesbury Workers are Employed, 2018

Industry	Shutesbury	Franklin County	Massachusetts
Agriculture, forestry, fishing and hunting, and mining	0.4%	2.3%	0.4%
Construction	2.6%	6.2%	5.6%
Manufacturing	4.4%	9.7%	8.9%
Wholesale trade	0.4%	2.1%	2.2%
Retail trade	8.3%	10.5%	10.3%
Transportation and warehousing, and utilities	1.9%	3.8%	3.8%
Information	3.4%	2.1%	2.3%
Finance and insurance, and real estate and rental and leasing	3.2%	4.0%	7.4%
Professional, scientific, and management, and administrative and waste management services	10.8%	7.7%	13.8%
Educational services, and health care and social assistance	49.2%	34.9%	28.2%
Arts, entertainment, and recreation, and accommodation and food services	7.2%	7.7%	8.7%
Other services, except public administration	4.1%	4.4%	4.5%
Public administration	5.5%	4.6%	3.9%

Source: 2014-2018 ACS Five-Year Estimates

Shutesbury residents are more likely to work from home (9 percent) than county (7 percent) and Commonwealth residents (5 percent) on the whole.[24] Of Shutesbury residents who leave their

[24] American Communities Survey 2014 – 2018 5-Year Estimates

home for work, 97.5 percent leave town: 18 percent commute to Amherst, 6 percent to Northampton, 5 percent to Greenfield, and 4.5 percent to Springfield.[25] The mean travel time to work for employed Shutesbury residents was 30 minutes, reflecting the large number of residents that commute to the better labor markets along I-91.[26]

As of 2017, roughly 132 people worked in Shutesbury, predominantly in the public administration and educational services sectors, but also in other services.[27] Most people working within the bounds of Shutesbury are municipal employees working for the Town at Town Hall, the Highway Department, the Library, or the Shutesbury Elementary School. Ultimately, few employment opportunities exist within Shutesbury, and the job market in Shutesbury is unlikely to change dramatically due to the limitations on industrial and commercial development imposed by topography and the water supply. There is therefore only a very small population of people from out of town working in Shutesbury who may have recreation needs during the workday.

In sum, Shutesbury's open space and recreation needs in the coming decade will be primarily driven by an aging, low-density, and moderately wealthy population. The Town of Shutesbury's ability to invest in open space and recreation is a function of the municipal budget, how the community prioritizes spending, and how it leverages other funding sources (see *D.3.2 Cost of Community Services* for information on how different land uses impact the municipal budget). Over the years, residents and the Town have demonstrated a commitment to planning and leveraging their resources to protect open space and enhance recreational opportunities through zoning, conservation restrictions, Agricultural Protection Restrictions, Chapter 61 enrollment, support for public land, and adoption of a 1.5 percent property tax levy for the Community Preservation Act. The OSRP functions to organize and prioritize open space and recreation needs in a way that responds both to the evolving community character and to projected growth and development patterns so that the Town can use its resources effectively.

D. GROWTH & DEVELOPMENT PATTERNS

Shutesbury's most valuable resources are its people and its landscapes. The interdependent relationship between the two define both the town's character and its financial wellbeing. This section examines historical and future landscape and growth patterns through the lens of population, land use, infrastructure, and the Town's current land use controls to help predict the future impact of development on the landscape. This section also explores the impact of different kinds of development on the cost of community services.

[25] U.S. Census Longitudinal Employer-Household Dynamics

[26] American Communities Survey 2014 – 2018 5-Year Estimates

[27] U.S. Census Longitudinal Employer-Household Dynamics

D.1 Patterns and Trends

As a Western Massachusetts "hill town," Shutesbury demonstrates historical rural development patterns strongly tied to its topography. Although many areas of the town were cleared for subsistence agriculture by European-American settlers in the 1700s, Shutesbury's cooler climate and poorer soil conditions at elevations over 1,000 feet did not support the intensive agriculture of the Connecticut River floodplain that provided a foundation for communities with larger populations.

Original settlement occurred along established roads, with more densely clustered residences located through the center of town along Leverett Road, in Locks Village at Lake Wyola, and at Pratt Corner. Settlement often concentrated around mill sites as well, of which there were at least 15 in operation in 1855.[28] The 1871 Beers Atlas identifies at least eight schoolhouses throughout town.[29] Beginning in the 1820s, an outmigration of Shutesbury residents led to the abandonment of much of the town's early development. Today, few of these small neighborhoods, apart from Town Center, are noticeable. The cornmills and sawmills are gone, as is most of the cleared agricultural land, although some farmhouses remain. The rapid growth in residential development between 1970 and 2000, however, tended to follow early development patterns along original roads. Only the northeast corner of Shutesbury was not re-settled in this manner, ceding to forest when the state purchased the area for the Quabbin Reservation and Shutesbury State Forest.

There are no formal shops, restaurants, gas stations, industries, etc., and only a small number of town-based businesses in Shutesbury: a law office, an excavating company, a junkyard, two outdoor recreation camps, a restaurant and bar, and the Saturday farmers' market. There are a number of home-based businesses, such as quilter, massage therapist, piano teacher, and physical therapist. The bedroom community that Shutesbury is today lies in stark contrast to the cottage-industry-rich, farming and forestry community that it was in the late nineteenth and early twentieth centuries.

Changes in land use and land cover over the past five decades generally reflect concurrent population trends. From 1972 to 2005 — a period that correlates with the town's recent population boom — 7 percent of the town's forest cover was converted to other land use cover type (from 94 percent to 87 percent). Over that same period, almost 3.5 percent of the town's acreage was converted to residential use (from 2 percent to 5.5 percent).[30] The most recent data available through MassGIS maps land cover derived from 2016 statewide imagery and land use derived from standardized assessor parcel information. As Table 3-6 shows, an estimated 88.8 percent of Shutesbury land cover is forest (deciduous and evergreen); 0.4 percent in agricultural use (pasture/hay); 6.0 percent water or wetland (water and wetland); 1.4 percent impervious (i.e., residential, industrial, and commercial development and roads); and 1.4 percent developed open space (e.g. ball fields, playgrounds). The largest areas of unforested open space (pasture, hayfield, meadow or cropland) are located in Shutesbury Center. Due to a change in methodology and technology used to collect this data, the 2016 acreages cannot be compared to earlier sets of data

[28] *Shutesbury Master Plan*, 2004

[29] https://www.shutesbury.org/Historic_Maps

[30] *Shutesbury Open Space and Recreation Plan*, 2012

(2005, 1999, 1985 and 1971). Although forestland counts for almost nine-tenths of the town's land cover, it is split between a variety of land uses, including forest, residential, open land, recreation, and tax-exempt uses.[31]

Table 3-6: Summary of Shutesbury Land Cover, 2016

Land Cover Category	Acres	Percentage of Total Town Acreage
Bare Land	75	0.4%
Cultivated	0	0.0%
Deciduous Forest	5,667	32.7%
Developed Open Space	236	1.4%
Evergreen Forest	9,730	56.1%
Grassland	231	1.3%
Impervious	241	1.4%
Aquatic Bed	9	0.0%
Emergent Wetland	85	0.5%
Forested Wetland	533	3.2%
Scrub/Scrub Wetland	48	0.3%
Pasture/Hay	73	0.4%
Scrub/Shrub	30	0.2%
Water	359	2.1%
Total	17,337	100%

Source: MassGIS

Forestland in Shutesbury is predominantly in public or private ownership of whole, undeveloped parcels rather than as part of residential parcels. Thirty-six percent of Shutesbury's forest is owned by the Commonwealth of Massachusetts under the management of the Department of Conservation and Recreation as a water supply resource and as state forest and will remain protected from development as long as it is needed for these purposes. The local forestry company, WD Cowls, owns 17 percent of Shutesbury's forest. And while not much of Shutesbury's forests is owned by residential landowners relative to other small towns in the area, families owning small private woodlots are an important community agent in land use decisions and land protection. [32]

As previously described, most residential development occurred in the recent past. A breakdown of the age of homes shows how much of Shutesbury's housing stock was constructed during the intensive period of population growth (1970s –1990s). Seventy percent of the homes in Shutesbury

[31] MassGIS 2016 Land Use Data

[32] https://masswoods.org/monthly-update-tags/ma-forest-ownership

(622 out of 888) were built in the fifty years since 1970. Fewer than one third of homes were built prior to 1970: 21 percent from 1940 to 1969 and only 9 percent before 1940.[33]

From 1970 through 2000, most new development occurred along town roads, outside the historic village areas. The dominant development pattern was of single-family homes on approval-not-required (ANR) lots. Long, undeveloped stretches of major roads made this kind of development easy. Interestingly, a large number of houses in Shutesbury are set back far enough from the road that they are not readily visible from the road; the density of housing along these forested roads is most discernable by the frequency of mailboxes.

Build-out analysis in 2004 for the Town Master Plan showed that the zoning in place at that time could eventually allow for five times as many dwelling units as existed in 2000, accommodating up to 10,000 more people in town.[34] The analysis demonstrated considerable fragmentation of backland forests, threatening the character of and access to Shutesbury's forest. In response to this analysis and population projections estimating continued population increase, in 2008 the Town extensively revised its zoning bylaws to discourage backlot development and low-density subdivisions.

According to the Franklin County Cooperative Inspection Program, the residential development trends of the 1970s through 1990s had slowed considerably as of 2010. More than half (9 of 17) of the permits issued between 2010 and 2019 were for replacement of existing homes (see Table 3-7). Ten of the 17 permits were issued for houses on or proximate to Lake Wyola (one new home and nine replacements), demonstrating a trend in recent decades of transitioning homes around the lake from seasonal cottages to year-round homes.

[33] American Community Survey 2014-2018 Five-Year Estimates

[34] *Shutesbury Master Plan*, 2004; this figure assumed that all back lots would be developed as ten-acre subdivisions despite current constraints due to soils, slope, and depth to groundwater.

Table 3-7: New Homes Permitted in Shutesbury per Year, 2010-2019

Year	New Homes	Replacement Homes	Accessory Units
2010	1	0	1
2011	0	4	0
2012	0	0	0
2013	2	1	0
2014	0	0	0
2015	1	0	0
2016	0	2	0
2017	2*	1	*In-law included in one new build
2018	0	1	0
2019	1	0	0
Total Permit Type	**7**	**9**	**1**
Total Permits	**17**		

Source: Franklin County Cooperative Inspection Program, 2020

The 2017 Vision for Shutesbury Executive Summary remarks that the 2004 Shutesbury Master Plan "was predicated on the projection that the trends of rapid population growth and demographic change in the town would continue," and based on those assumptions, focused on land use planning, growth management, housing alternatives, and environmental protection. However, because Shutesbury's population leveled off in the 2000s, the town had to revisit the 2004 Master Plan to account for new, unexpected challenge, especially the increasing property tax burden. Current land use controls, future land use forecasts, and the challenge of balancing community needs and municipal budgets are explored further in *D.3 Long Term Development Patterns*.

D.2 Infrastructure

D.2.1 Transportation

Shutesbury has 42 miles of mostly rural roads.[35] The town maintains 31 miles of road: 15 miles of paved roads and 16 miles of gravel roads. Massachusetts DOT is responsible for 3.1 miles of road (on Route 202), and DCR for 5.1 miles of road (gravel roads in the Quabbin Reservation

[35] FRCOG. *2020 Franklin County Regional Transportation Plan*, 2019: https://frcog.org/publication/franklin-county-regional-transportation-plan-2020/

and Shutesbury State Park). Route 202 is a paved, north-south trending state highway that cuts across the southeast corner of town and is a major transportation route for points to the north and east. In addition to public roads, there are also a number of private gravel roads, especially around Lake Wyola. Although stormwater management challenges affecting gravel roads are increasingly a burden to the Town under changing climate conditions, the summary findings of the town's 2020 MVP workshop notes that paving gravel roads is unlikely because it would impose a large financial burden on the Town and impact Shutesbury's rural character.

While the Franklin Regional Transit Authority (FRTA) and the Pioneer Valley Transit Authority (PVTA) provide active service to towns to the south and west; neither paratransit service nor demand-response service is available in Shutesbury. The FRTA does provide Med-Ride service for persons over the age of 60 needing transportation to Franklin, Hampshire, or Hampden Counties for medical appointments.[36] In 2016, a feasibility study for fixed-route transit for southeastern Franklin County found that "a bus route originating from Greenfield to the eastern portion of Franklin County would be a benefit to residents," but due to high operating costs the route would be difficult to sustain financially.[37]

The Massachusetts Department of Transportation (DOT) and the Federal Highway Administration have recently focused their attention on the important role non-vehicular modes of transportation, like walking and biking, play in making a community livable. Currently, biking, walking, and horseback riding can take place only on narrow roads in Shutesbury, as there are few to no sidewalks, bike lanes, or even wide shoulders to accommodate these users. The 2017 Shutesbury Vision Report describes a future for the town in which the Town Center is bolstered with new pedestrian walkways (between Shutesbury Elementary School and M.N. Spear building). *The 2021 Franklin Count Regional Pedestrian Plan* found that the greatest opportunity for improving pedestrian experiences in Shutesbury would be introducing traffic calming measures to help reduce vehicle speeds in areas of pedestrian activity, and that the need for sidewalks would have to be assessed.[38] Having adopted a Complete Streets Policy, Shutesbury is now eligible for funds to complete a Complete Streets Prioritization Plan that could further assess and design pedestrian needs.[39]

D.2.2 Water Supply

Wells are Shutesbury's only source of drinking water. Wells can be either shallow, dug wells or drilled, deep wells. Because of the limited distribution of unconsolidated aquifer deposits, the majority of wells in Shutesbury tap the bedrock aquifer. Public water supply wells regulated by

[36] The Med Ride Program is suspended during the Covid-19 period, according to the Council on Aging web page on Shutesbury.org.

[37] FRCOG. *Feasibility Study for Fixed Transit in East County*, 2016, p.4: https://frcog.org/wp-content/uploads/2014/02/East-County-Transit-Study_Final.pdf

[38] FRCOG. *Regional Pedestrian Plan for Franklin County*, 2021: https://frcog.org/wp-content/uploads/2021/11/Pedestrian-Plan-for-Franklin-County-2021.pdf

[39] Shutesbury Complete Streets Policy: https://www.shutesbury.org/sites/default/files/files-and-images/policies%20and%20guidelines/Policy%20191029_CompleteStreetsPolicy.pdf

the Massachusetts Department of Environmental Protection (DEP) service the Shutesbury Elementary School, Lake Wyola State Park, the Pine Brook Camp and Conference Center, the Shutesbury Athletic Club, and the Sirius Community. DEP regulates wells when they serve water for human consumption to an average of at least 25 individuals daily for at least 60 days of the year. The remainder of Shutesbury is serviced by private wells regulated by the Shutesbury Board of Health.

In general, both Shutesbury's private and public wells experience good water quality. Salt and sedimentation in wells along Leverett Road remains a concern, as does PFAS chemicals[40] found in select areas around town following testing in 2021. Thus far, water has been abundant in Shutesbury, although yields of bedrock aquifer wells are relatively low compared to yields needed for community water supplies. The reliance on individual wells, the infeasibility of a traditional community wastewater system, and the steep topography limit residential development and reduces the potential for commercial and industrial development.

D.2.3 Sewer Service

All Shutesbury residents are on private septic systems. The Board of Health does a careful job of making sure new septic systems and wells are properly separated from one another. According to the Town of Shutesbury's Board of Health Regulations, all wells for residential development must be located at a specified distance from potential contamination sources: sub-surface sewage disposal field (100 feet), cesspool (100 feet), septic tank (50 feet), sewer line with watertight joints (25 feet), defined property line (25 feet), and dwelling or other structure (25 feet). The regulations also state that wells need to be upgradient from all potential sources of contamination. When applied to a parcel with shallow soils or varied topography, these minimum requirements can constrain the location and number of new house lots that can be constructed, although constraints are less now that mounded leach fields are permitted. Even when siting requirements are met, thin soils can be a poor filtering buffer for surface runoff or infiltration, potentially bringing contaminants (i.e., road salts, fertilizers, pesticides, hazardous wastes, septic system effluent, etc.) into contact with surface water or groundwater. This is a concern especially with the shallow wells and septic systems located adjacent to Lake Wyola.

There has been discussion over the years about constructing a small community wastewater treatment plant in the area of Lake Wyola to service the dense development of cottages and year-round houses around the lake that have shallow wells and are located on poor soils with a high water table. Another past proposal promoted the installation of a small community wastewater treatment plant for Town Center. The feasibility and success of any such community system would depend on finding areas suitable to construct soil absorption fields.

Barring public wastewater treatment, the most prudent approach to guaranteeing safe groundwater for drinking is to make sure that septic systems are designed properly (in accordance with the Title 5 Regulations), to replace failing systems, and to monitor development closely in areas around

[40] Per- and polyfluoralkyl substances (PFAS) are man-made chemicals (including PFOA, PFOS, GenX, and others), also known as "forever chemicals", that persist in the environment and human body and are hazardous to human health. PFAS are found in a wide range of ordinary consumer products and in drinking water.

water resources. Shutesbury's 2020 MVP workshop participants expressed concern that repair or replacement of septic systems places an economic burden on residents. The Town runs a Septic Betterment Loan Program that provides financial assistance for residential septic upgrades.

D.2.4 Solid Waste Management

Shutesbury has no landfills but does operate a trash and recycling pick-up system in which solid waste is hauled to Community Eco Power in Agawam. The Pay-As-You-Throw program entitles each household to 50 bags per year (paid for by taxes). Residents can purchase a permit to take bulky waste items to the Leverett Transfer Station during specified hours. Residents can also deposit select hazardous waste items at the Town Hall year round and can participate in Household Hazardous Waste Collection Day at the Amherst Transfer Station every fall.

D.2.5 Internet

ShutesburyNet high-speed fiber-to-the-premises (FTTP) network completed connection in 2019. The network is provided by Crocker. This fiber network is the best internet network technology available in the region, out-performing the broadband connection that is available in many neighboring towns.

D.3 Long-Term Development Patterns

Population stagnation, environmental constraints, and the land use controls in place suggest that Shutesbury will experience limited development in the coming decade. Previous sections have illustrated how the low and variable yields of the bedrock aquifer, the limitations imposed on septic system construction by poor soils and high groundwater in town mean that residential development is naturally restricted from certain areas of town and limited in others. Similarly, topography and water supply limitations due to low-yielding bedrock wells appear to be highly restrictive to industrial and commercial development.

While the rate of development is largely controlled by forces outside of the community's control, the Shutesbury community has generally been forward thinking in its approach to preserving places it loves. Many residents have protected land either temporarily through the state's Chapter 61 tax abatement program or permanently through CRs and APRs. The town has been amenable to public purchase of large blocks of land with high ecological value. In 2008, Shutesbury significantly revised their zoning bylaws to implement a progressive approach to integrating open space protection with development. Additionally, in 2008 Shutesbury adopted the Community Preservation Act (CPA). The CPA allows communities to create a local Community Preservation Fund to raise money through a surcharge of up to 3 percent of the real estate tax levy on real property for open space protection, recreation, historic preservation, and the provision of affordable housing, which is then matched through a state CPA fund. Shutesbury currently operates with a 1.5 percent tax levy for CPA funding and has used these funds for over ten projects.

At this time, no large residential development projects or infrastructure expansions are planned for Shutesbury. However, five large solar farms proposed for privately owned forested parcels in

Shutesbury are currently under review. *Section 4.I: Environmental Challenges* outlines additional environmental concerns affecting Shutesbury.

D.3.1 Land use Controls

In 2002, the Master Planning Committee developed and approved land use and zoning goals that informed a zoning re-write in 2008. After a long process of drafting the bylaw and responding to public and private concerns about the impact on land use and values, the Water Supply and Watershed Protection Districts for Atkins Reservoir and Lake Wyola recommended by the Master Plan were not included, but a Lake Wyola District was created. The revised Town of Shutesbury Zoning Bylaw featuring open space design (OSD) provisions was put into effect in 2009 (see *Zoning Map* at the end of this chapter).

The OSD component of the bylaw (Article V) changed the zoning from one Residential-Agricultural District for the whole town to zoning that contains four districts with a built-in conservation component. The purpose of the new zoning codes is described in Section 1.1 of the bylaw as "protection of large contiguous tracts of forest land to maintain commercial forestry as a viable agricultural activity; the protection of water in the watersheds that supply drinking water to Amherst, Massachusetts, the Boston metropolitan area, and the Town of Shutesbury; the maintenance of a rural road system that includes many miles of unpaved roads; the protection of significant wildlife habitat in a healthy forest ecosystem; the allowance for mixed-use development in the Town Center area; the diversification of available housing types; greater affordability in housing; economic opportunities for residents including home-based businesses; and the clustering of residential development in compact settlements leaving large areas of open space undeveloped."[41]

The first of the four districts, the Roadside Residential (RR) District, extends 500 feet from the centerline of public roads in Shutesbury not encompassed by the Town Center or Lake Wyola district (see the *Zoning Map* at the end of this section). The RR District is designed to maintain the existing settlement pattern of residences and small businesses scattered throughout town, but within 500 feet of the designated public roadways. This district helps to ensure that development occurs primarily near existing public roads and not in backlots. The Town Center (TC) District extends along Leverett and Wendell Roads in the historic town center. The TC district is designed to enable the Town Center area to continue to exist as the center of community activity, while also allowing centrally located residential, civic, and commercial uses, including a mix of those uses. The Lake Wyola (LW) District surrounds Lake Wyola and is bounded by Locks Pond Road, Lakeview Drive, and Wendell Road. The LW District is meant to allow those who own land within the vicinity of the lake to make effective use of their properties without compromising the lake's water quality or aesthetic value. Finally, the Forest Conservation (FC) District encompasses all areas not mapped as RR, TC, or LW. The purpose of this district is to preserve large areas of contiguous forestland that are situated more than 500 feet from the centerlines of public roadways in order to maintain commercial forestry as a viable agricultural activity and to protect watersheds, recreational land, natural resources, and wildlife habitat. The district is also designed to protect substandard rural roads from overuse.

[41] Town of Shutesbury. *Town of Shutesbury Zoning Bylaw*, 2008, p. 1

As in most towns, the traditional modes for residential development in Shutesbury are approval-not-required (ANR) roadside development and subdivision. Traditional subdivision requires a minimum amount of road frontage per dwelling, promoting the construction of new roads into the farthest extents of undeveloped parcels. The OSD component of Shutesbury's bylaw works as a mechanism for conservation because it requires 65 percent minimum preserved open space per subdivision in the RR, LW, and TC districts, and 80 percent minimum preserved open space per subdivision in the FC district. The limiting factor in OSD subdivision thus becomes land area, not road frontage. To accommodate, the OSD provision allows for greater flexibility in parcel size, frontage, and other design elements to allow for greater density development in the remaining development area. Because the developed portions of the subdivided parcel are more compact and served by significantly less roadway, environmental impacts are minimized while keeping the costs of construction down. The subdivision on Old Orchard Road is a conservation development that helped inspire the OSD provision; there is one OSD development near Atkins Reservoir.

The minimum lot area is 90,000 square feet, or just over 2 acres, for all districts except the FC district (whose minimum is variable). Two-acres is a typical minimum lot size for towns without public water or sewer. The two-acre minimum area does facilitate a more sprawling development pattern than lower lot size minimums, which is especially noticeable in a town center district. Shutesbury's zoning bylaws do however establish smaller setbacks for the Town Center and Lake Wyola Districts, allowing more of the lot area to be developed to create a denser feeling to the built environment.

Shutesbury's Zoning Bylaws also include a number of overlay districts and other provisions as follows:

- Allowance of small wind energy systems with special permit;
- A floodplain overlay district (added in 2012) that includes all floodways and special flood hazard areas designated on Shutesbury's Flood Insurance Rate Map, which requires all structural and nonstructural activities be in compliance with various wetland, building, and sewage regulations;
- A ground-mounted solar electric installation (added in 2016, amended in 2019) bylaw that provides strict placement, design, construction, operation, monitoring, modification, and removal standards, especially for large-scale ground-mounted solar; and
- An adult use recreational marijuana establishment bylaw (added in 2019) designed to allow marijuana-based commercial development appropriate to the size and rural character of the town.

To encourage housing diversity that welcomes residents of varying income levels, the town allows two-family dwellings, multi-family dwellings, and accessory apartments. One attached or detached accessory apartments is allowed per lot. Allowing a range of housing types encourages further development where it already exists and provides greater income-generating and in-home support options for residents.

The updated 2008 zoning bylaws generally allow a variety of uses, especially in already-developed areas, while exercising greater influence over the subdivision process. Combined with regulations governing the placement of water and sewer, the land use code minimizes the impact of new development on the town's natural resources and open space access. Focusing development along

roadsides works relatively well in Shutesbury because there are few long-range views or rural features (historic barns, open fields, stone walls) visible from the road that roadside structures can interfere with. As stated in the 2017 Vision Report, however, the town must adjust and improve the zoning bylaws as needed to stay aligned with the community's vision for itself.

D.3.2 Cost of Community Services

The American Farmland Trust (AFT) and other organizations have conducted Cost of Community Services (COCS) analyses for many towns and counties across the country. A COCS analysis is a process by which the relationship of tax revenues to municipal costs is explored for a particular point in time. These studies show that open space, while not generating as much tax revenue as other land uses, require less public services and result in a net tax gain for a community. Residential uses require more in services than they provide in tax revenues compared to open space, commercial, and industrial land uses. Communities, at the time of the study, were balancing their budgets with the tax revenues generated by other land uses like open space and commercial and industrial property.

However, if a community has an excess in service capacity, new residential growth is not necessarily a strain on the budget. For example, if an increase in residents include families that add more students to an under-enrolled school system, the cost of educational services would not necessarily increase, as it would spread the existing fixed costs over a larger number of residents. When there is capacity to absorb more residents, the increase in the cost of services may be smaller than the increased income from taxes. Models such as the COCS analysis should be consulted and can provide support for open space and farmland preservation and for commercial and industrial development as a way to help small cities and towns balance their budgets.[42] The studies are not meant to encourage towns and cities to implement exclusionary zoning that seeks to make it difficult to develop housing, particularly for families with school age children. Any such study would have to take into consideration where development occurs relative to where services are located, as some outlying parts of Shutesbury are closer to other town centers than they are to Shutesbury Center, demonstrating that development in certain areas would create a greater financial burden than others unless regionalized services are in place.

Additionally, low vacancy rates in Franklin County suggests there is a pent-up housing demand in the county as a result of the 2008 recession and the hot housing market caused by the Covid-19 pandemic. Given that it is unclear whether population will increase or decrease in Shutesbury over the next few decades, the challenge for its residents will be to find a sustainable development model that sustains and enhances the community's rural and historic character and promotes a stable and equitable property tax rate. If population does increase in Shutesbury, protecting land while directing housing growth to the village center will help maintain the open space that provides a net revenue gain to the town and at the same time help meet the future housing needs of the population. An increase in small business development alongside conservation can help satisfy the desires of residents to maintain their community character while offsetting the tax burden. This approach must also be adaptable to recreation and open space needs that change over time as the composition of the community changes. By continuing to pursue growth management strategies

[42] MassWoods. https://masswoods.org/communityconservation

that include active land conservation and zoning measures that balance development with the protection of natural resources, Shutesbury will be better positioned to maintain a high quality of life for its residents.

SECTION 4

ENVIRONMENTAL INVENTORY AND ANALYSIS

This section of the Shutesbury Open Space and Recreation Plan provides a comprehensive inventory of the natural resources and significant cultural assets within the town. The purpose of this section is to provide a factual basis upon which assessments can be made. The *Climate Change Impacts* subsection provides localized climate data and identifies vulnerabilities to climate change that may impact the town's cultural and natural assets. The *Documenting and Mapping Ecosystems* subsection provides a guide to tools available for prioritizing parcels of land based on biological and physical attributes that make land highly valuable for conservation. The *Soils, Geology, and Topography* subsection provides a general understanding of the ways different soil characteristics can impact land use values. *Landscape Character* provides an overall scenic context. *Water Resources* describes all of the water bodies in town, above and below ground, including their recreational value, public access, and any current or potential quality or quantity issues. *Vegetation* documents Shutesbury's forest, farmland, and wetlands and *Fisheries and Wildlife* documents wildlife habitat and rare, threatened, and endangered species. Shutesbury's *Scenic Resources and Unique Environments* section identifies special places, trails, and views. Finally, *Environmental Problems* addresses current and potential problems that may influence open space or recreation planning.

Each of these resource areas is analyzed from two perspectives. First, the chapter demonstrates how the town's natural resources provide Shutesbury residents with basic ecological services and cultural amenities. Ecological services include functions like drinking water filtration, flood storage capacity, species diversity, carbon sequestration and climate change mitigation, and soil nutrient levels. Cultural amenities include the recreational use of open spaces, the quality of life benefits afforded by rural character and scenic beauty, and the direct and indirect beneficial impacts that well-conserved natural resources such as good drinking water have on community well-being. Second, it determines whether the resources require conservation or management so that the quantity and quality required by the citizenry is sustained.

A. CLIMATE CHANGE IMPACTS

Natural resources, including wildlife and habitats, are being impacted by a changing climate in Massachusetts and will continue to be impacted as temperatures rise and precipitation amounts change over the coming decades. According to the Massachusetts Wildlife Climate Action Tool,[1] warming is occurring in all seasons, with the greatest changes in winter, at higher latitudes, and potentially at higher elevations. Seasonal warming is extending the growing season, particularly with more frost-free days occurring earlier in spring. Precipitation amounts are increasing,

[1] http://climateactiontool.org/

especially in winter. Warmer winters are also resulting in more precipitation falling as rain instead of snow, leading to reduced snowpack — though stronger blizzards may lead to locally higher snowpack in Massachusetts and New England. In the summer, heavier downpours combined with longer dry periods are expected, increasing the risk of both droughts and floods. Sea level is also rising along the Massachusetts coastline, leading to coastal flooding, which is compounded by increasingly intense coastal storms, such as hurricanes.

Natural resources play an important role in mitigating future climate change, but are also vulnerable to its impacts. Local decisions about how natural resources are managed and conserved will affect the ability of people, habitats, and species to cope with future climate changes. Following is an overview of the two major impacts of climate change for Massachusetts and Shutesbury: changes in temperature and precipitation. More information about specific climate change vulnerabilities due to these impacts and about adaptation strategies is incorporated into relevant sections, including *4.I. Environmental Challenges.*

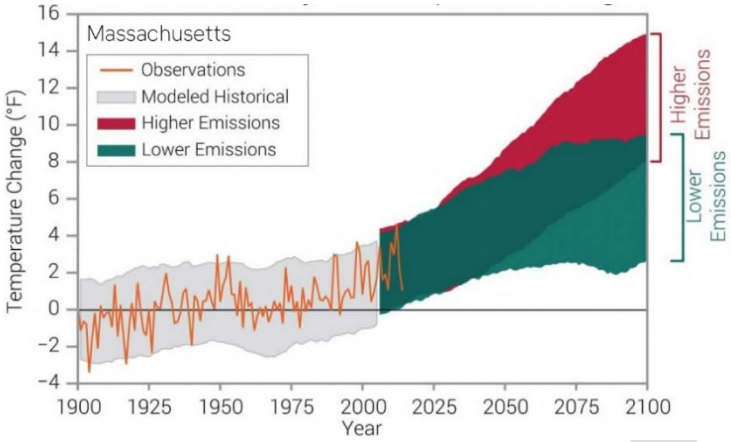
A.1. Temperature Changes

The northeast United States has experienced an increase in annual temperatures of 1.6°F over the last century, with the greatest warming happening in the winter.[2] Depending on future global greenhouse gas (GHG) emissions scenarios, average annual temperatures in Massachusetts are expected to be 2.8°F to 6.2°F warmer by 2050 than in the past several decades (when the average annual temperature was observed to be 47.5°F). By 2090, the average annual temperature in the state is expected to increase by 3.8°F to 10.8°F, depending on varying emissions scenarios.[3]

The Resilient MA climate change data clearinghouse provides climate projections at the watershed level.[4] Shutesbury falls half in the Chicopee River Basin and half in the Connecticut River Basin. Using the Chicopee River Watershed as an example, overall observed average annual temperature between 1971 and 2005 was 46.2°F. Average annual temperatures in the watershed are expected to increase between 3.0°F and 6.4°F by 2050 depending on future GHG emissions levels (Figure 4-1); by 2090, average annual temperatures in the watershed could increase by 4.0°F to as much as 11.0°F depending on global emissions.

[2] Massachusetts Wildlife Climate Action Tool, http://climateactiontool.org/content/temperature-changes
[3] Resilient MA: Climate Change Clearinghouse for the Commonwealth, http://www.resilientma.org
[4] Resilient MA: Climate Change Clearinghouse for the Commonwealth, http://www.resilientma.org

Figure 4-1: Observed (1971-2005) and Projected Average



Source: Resilient MA: Climate Change Clearinghouse for the Commonwealth[5]

In addition to overall warming temperatures, it is expected that an increase in extreme high temperatures will occur. For example, in Massachusetts there will be between 7 and 26 more days over 90°F in 2050 compared to the past several decades. In the Chicopee River Watershed, it is expected that by 2050, there will be anywhere from 8 to 29 more days with temperatures over 90°F. From 1970 to the mid-2000s, the watershed averaged less than 3 days per year when temperatures reached over 90°F. Conversely, the watershed is expected to experience fewer days when temperatures drop below freezing (32°F).

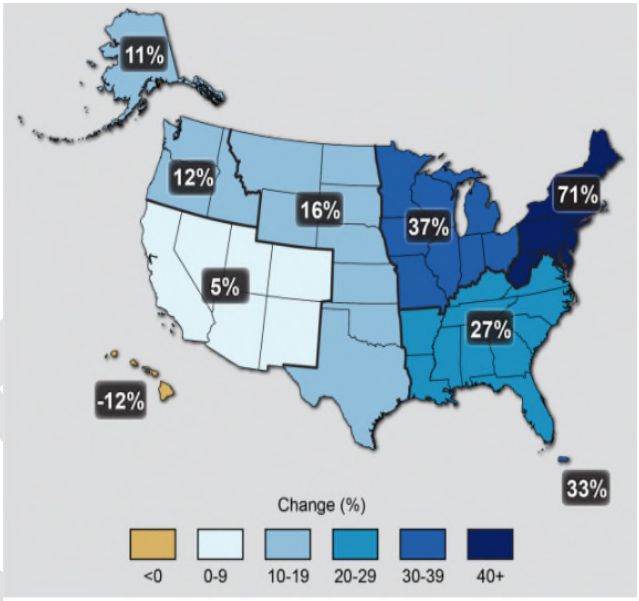
[5] Resilient MA Datagrapher: http://www.resilientma.org/datagrapher/

A.2. Precipitation Changes

In Massachusetts, annual precipitation amounts have increased at a rate of over 1 inch per decade since the late 1800s, and are projected to continue to increase largely due to more intense precipitation events.[6] In recent decades, the Northeast has experienced a greater increase in extreme precipitation events than the rest of the U.S (Figure 4-2). Although overall precipitation is expected to increase, it will occur more in heavy, short intervals with a greater potential for dry, hot, drought conditions in between.

Observed annual precipitation in Massachusetts for the last three decades was 47 inches.[7] Total annual precipitation in Massachusetts is expected to increase between 2 percent to 13 percent by 2050, or by roughly 1 to 6 inches.[8] In the Chicopee River Watershed, annual precipitation has also averaged around 47 inches in recent decades. By 2050, the annual average could remain relatively the same (but occur in more heavy, short intervals) or increase by up to 6 inches a year. In general, precipitation projections are more uncertain than temperature projections.

Figure 4-2: Observed Change in Very Heavy Precipitation, 1958-2012



The northeast has seen a greater increase in heavy precipitation events than the rest of the country. *Source: updated from Karl et al. 2009, Global Climate Change Impacts in the United States.*

A.3. Effects of Climate Change

Climate change is already altering natural habitats and impacting communities in various ways. Ecosystems that are expected to be particularly vulnerable to climate change include coldwater streams and fisheries, spruce-fir forests, hemlock forests, northern hardwood forests, vernal pools, and street trees in town centers. Warming temperatures and changes in precipitation will push plant and animal species northward or to higher elevations. Higher temperatures, along with changes in stream flow, will degrade water quality and coldwater species will decline. Despite increased precipitation, higher temperatures will also lead to more frequent drought, while an increase in stronger storms will lead to more flooding and erosion. A shift to winter rains instead of snow will potentially lead to more runoff, flooding, and greater storm damage along with lowered spring groundwater recharge.

An increase in extreme weather events, including heavy rains, ice storms, microbursts and hurricanes, will impact natural resources and human communities. Loss of roads, bridges, culverts,

[6] Massachusetts Wildlife Climate Action Tool: http://climateactiontool.org/content/temperature-changes
[7] Massachusetts Wildlife Climate Action Tool: http://climateactiontool.org/content/temperature-changes
[8] Resilient MA Datagrapher: http://resilientma.org/datagrapher/?c=Temp/basin/pcpn/ANN/Millers/

buildings, farmland, and crops are a few of the impacts that have already been experienced in the region from increased extreme weather. Sea level rise and more extreme storms on the coast may not directly impact Shutesbury but may begin to push some of the millions of people living along the north Atlantic seaboard to move inland, placing development pressure on rural areas.

Shutesbury participated in a Community Resilience Building workshop (CRB)[9] in May 2020 in which residents identified the current concerns and challenges presented by climate hazards. These concerns are highlighted in the Shutesbury Municipal Vulnerability Plan (MVP) as:

- Significant stress on roads (especially gravel roads), dams, culverts, and other drainage infrastructure due to increasing regularity of severe storms delivering higher volumes of precipitation.
- The adverse impact of drought on private wells and water supplies used for firefighting purposes.
- Increased mosquito and tick populations that increase both the threat and actual incidence of vector-borne diseases.
- Extreme high temperatures that increase the need for equipment to cool buildings.
- Higher impact storms that impact power lines and thereby the ability to travel out of town for supplies.
- Greater vulnerability of seniors to extreme weather and the impacts of isolation.

While climate change will continue to be a major challenge globally, local efforts and decisions have real and lasting impacts on mitigating and adapting to future climate change. One of the most effective, and least costly, strategies for adaptation is to preserve existing natural areas and manage them for increased resilience to climate change.

Quabbin Reservoir Gate 16 (Dan Diffendale)

[9] A community-driven planning process developed by The Nature Conservancy: https://www.communityresiliencebuilding.com/

B. DOCUMENTING & MAPPING ECOSYSTEMS

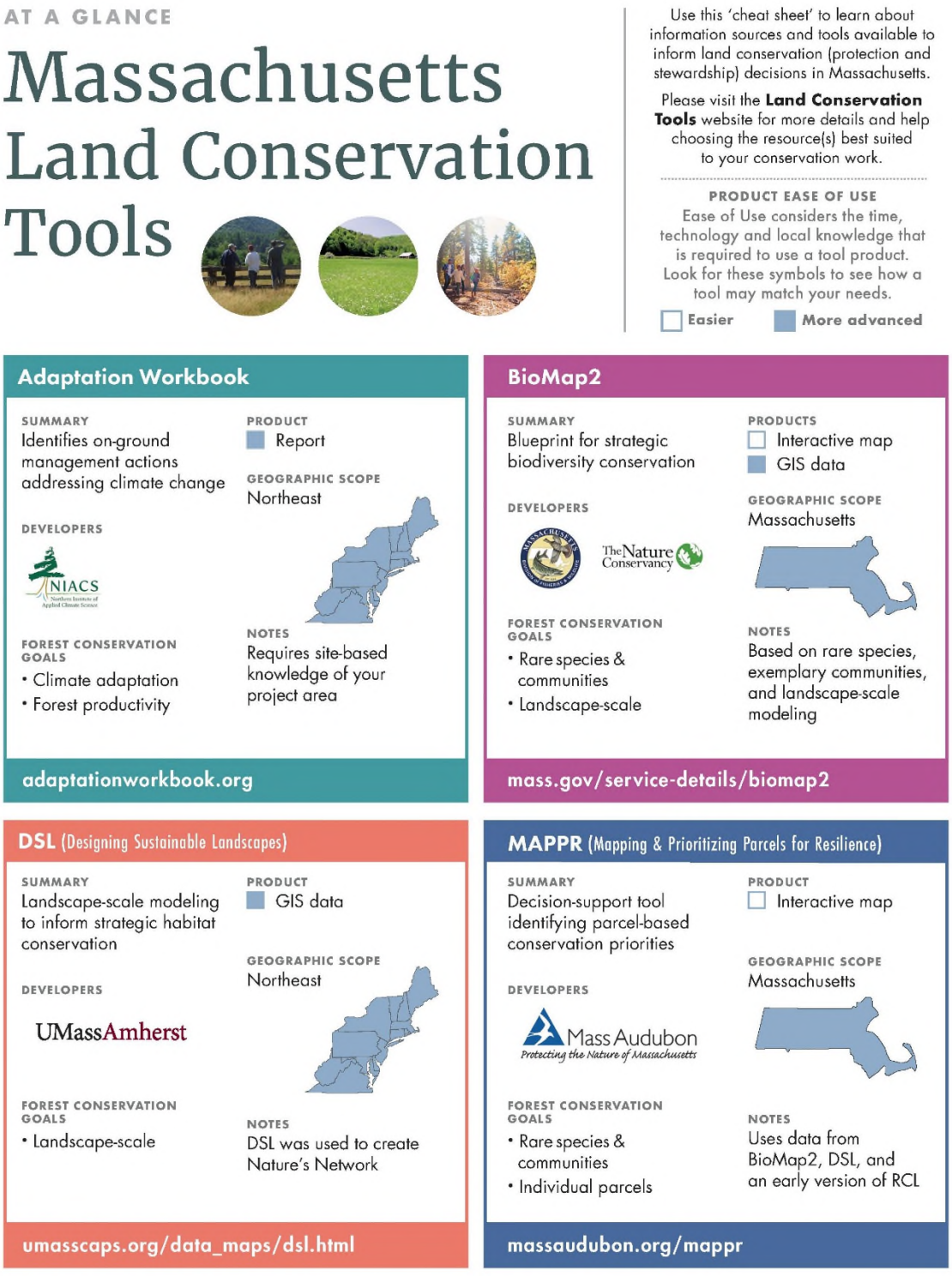
Shutesbury Town officials and residents can use the climate and environmental information in this chapter as a reference when making land use decisions, including planning open space protection. Development, when sited in undeveloped areas rather than as infill in already developed areas, can require infrastructure such as roads, power, water, and wastewater systems. Such infrastructure both depends upon and impacts critical natural systems. Ideally, the permanent conservation of select parcels helps protect the town's scenic value and natural resources in the face of changes in land use and climate change impacts, while recognizing that people need places to live, learn, work and play.

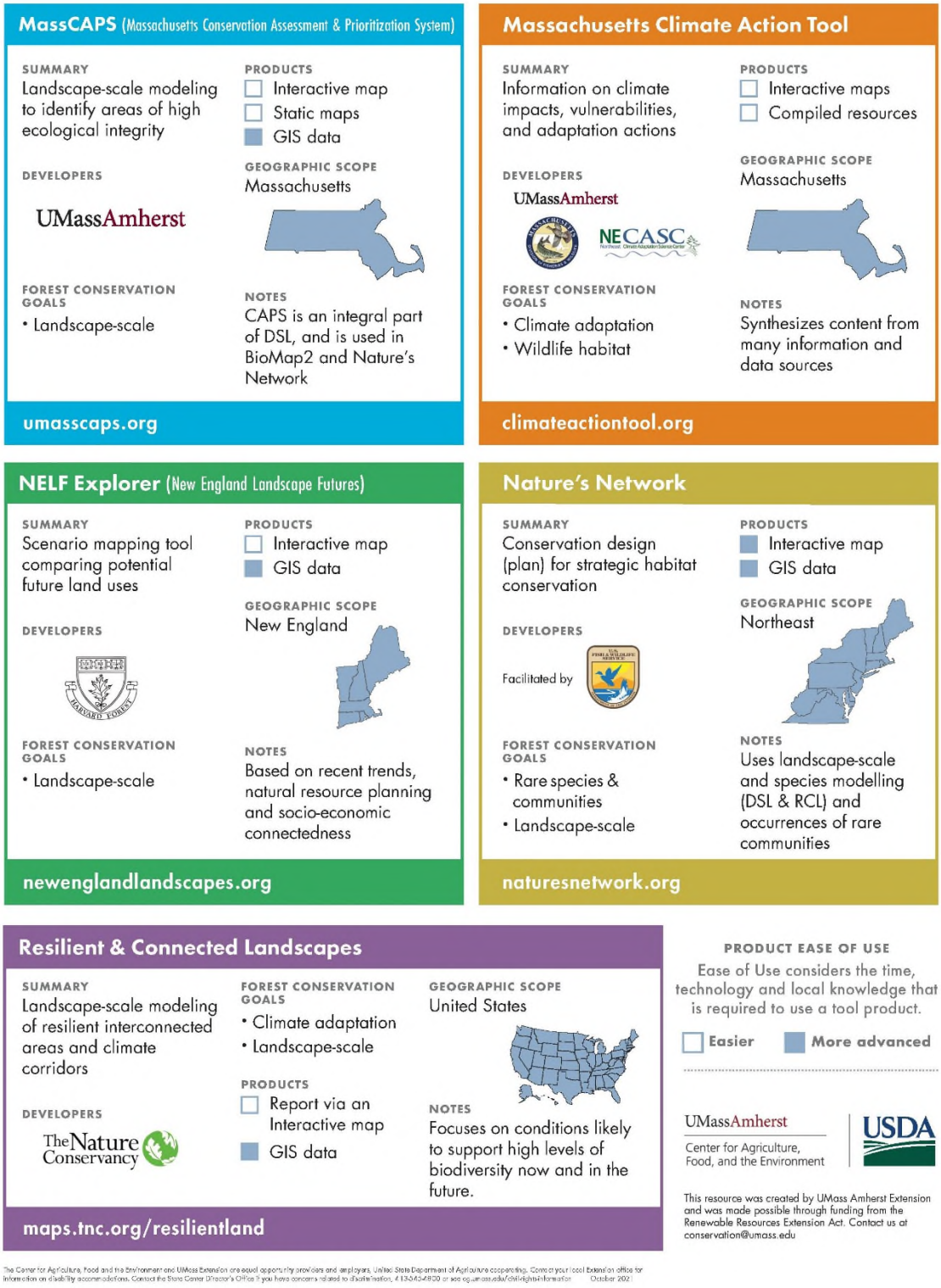
One way to understand the impact of development on natural resources and the community's wellbeing is to document the value of the town's and region's ecosystems — the geographically specific complex relationship between organisms, their environment, and the processes that control their dynamics. Ecosystems are critical natural systems that can help communities weather the impacts of climate change and other environmental issues. Mapping ecosystems and habitats and documenting their contributions to biodiversity and climate change resilience can be a first step toward protecting and preserving these resources.

Proactive conservation decisions based on scientific assessment can maximize the value of limited resources. All too often, the consideration of land for conservation is reactive, responding to an imminent threat. Typically, there is not enough time to take action. Sometimes actions come in response to a chance opportunity on land that may have comparatively low conservation value to other parcels, but because of pressure to act quickly, precious resources are used to protect such a parcel. While reactive conservation decision-making will continue to be a valid approach to land conservation, prioritizing parcels or areas based on their conservation value optimizes the benefits of open space protection given limited resources. Mapping ecosystems and prioritizing areas for land protection is a particularly smart strategy for municipalities who may have the opportunity to make decisions under the Right-of-First-Refusal provision for lands coming out of Chapter 61 status.

The University of Massachusetts's Center for Agriculture, Food, and the Environment manages a clearinghouse of land conservation information sources and tools developed by various organizations that are available to guide the decision making of Massachusetts land conservation practitioners. The "Land Conservation Tools" website provides links to commonly used tools such as BioMap2, Audubon's Mapping and Prioritizing Parcels for Resilience, and The Nature Conservancy's Resilient and Connected Landscapes, among others. These tools provide decision-makers with ecological criteria for prioritization and evaluate open space parcels against that criteria. The clearinghouse can be found at https://ag.umass.edu/resources/land-conservation-tools (see Figure 4-3).

Figure 4-3: Massachusetts Land Conservation Tools Cheat Sheet





Source: University of Massachusetts Amherst Center for Agriculture, Food, and the Environment: https://ag.umass.edu/resources/land-conservation-tools

C. GEOLOGY, SOILS & TOPOGRAPHY

C.1 Geology

C.1.1 Bedrock Geology

The Bedrock Geologic Map of Massachusetts indicates that the bedrock of Shutesbury lies east of the Triassic-aged Connecticut Valley Border fault, and most of town is underlain by the rocks of Pelham Dome.[10] The Pelham Dome consists of the Proterozoic Z-aged metamorphic gneisses, schists, amphibolites and quartzites of the Dry Hill Gneiss and Mount Mineral Formation. Originally sedimentary rocks, these formations were transformed by the high pressure and temperature conditions associated with the collision of the Earth's tectonic plates. A portion of the Bronson Hill Anticlinorium (a large fold in the Earth's crust) underlies the eastern edge of town along the West Branch of the Swift River and Quabbin Reservoir. The Bronson Hill Anticlinorium contains the gneisses and amphibolites of the Fourmile Gneiss and Monson Gneiss (of Ordovician, Cambrian or Proterozoic Z age), the schists and amphibolites of the Partridge Formation (Middle Ordovician age), and the schists and phyllites of the Littleton Formation (Lower Devonian age). In the southeastern corner of town, the older rocks of the Bronson Hill Anticlinorium are intruded by Jurassic-aged diabase dikes and sills (formations associated with volcanic events).[11]

C.1.2 Surficial Geology

Detailed surficial geologic mapping for Shutesbury was done in 1978 by Janet Radway Stone and presented in a preliminary map entitled *Preliminary Map of Surficial Deposits in the Shutesbury Quadrangle, Massachusetts*.[12] At the same time, Stone also mapped the northernmost section of Shutesbury that is located in the Wendell quadrangle. Much more recently (in 2010), the results of this mapping effort have been published in a document entitled *Surficial Geologic Map of the Heath-Northfield-Southwick-Hampden 24-Quadrangle Area of the Connecticut Valley Region, West-Central Massachusetts*. However, the original preliminary map for the Shutesbury Quadrangle still contains the most detailed, Shutesbury-specific descriptions of the surficial geology.

The surficial geology in Shutesbury consists mostly of glacial till that blankets the bedrock in a layer ranging from 0 to 50 feet in thickness. Bedrock has been estimated to be less than 10 feet from the surface at numerous locations on the higher, steeper hills, particularly those in the eastern half of town where bedrock is present at the surface in numerous outcrops and ledges. Glacial till is a non-sorted, non-layered mixture of materials of all grain sizes: clay, silt, sand, pebbles, cobbles, and boulders. The till is light gray, loose, and extremely sandy, with few stones and boulders. In some areas, however, the looser till is underlain by a darker, fine-grained compact till. The till layer is generally thicker on the northern and western sides of hills and thinnest or absent on the southern and eastern sides of hills.

[10] E-an Zen, et al., 1983, published by the United States Geologic Survey
[11] Considerable more details on bedrock and surficial geology in Shutesbury are included in the 2012 Shutesbury Open Space and Recreation Plan, which also contains a number of geologic maps.
[12] United States Geological Survey (USGS) *Open File Report 78-285*

The sorted, layered deposits of glacial stratified drift (consisting of gravel, sand, silt, and clay deposited by glacial meltwater streams) are found mainly in and along principal stream valleys and basins where they overlie till. Stratified drift deposits are found along the West Branch of the Swift River and Baker Brook, and around Ames Pond, Lake Wyola and Atkins Reservoir. Because these deposits in Shutesbury are much thinner than they are in the Connecticut Valley, opportunities for gravel mining operations are relatively limited in town, as opposed to areas such as in Sunderland, where thick kame and deltaic deposits exist. The sands and gravels found in the Dean Brook Valley, the Roaring Brook Valley, Dudleyville Marsh, Moore's Corner Basin, and the South Brook Valley are lacustrine deposits that formed in temporary small glacial lakes and ponds. These deposits become finer in grain size with depth. The sand and gravel deposits in all of these areas range from 0 to 50 feet in thickness.

The remaining surficial geologic deposits are modern stream alluvium and swamp deposits. Modern alluvium is found in the major valleys such as Roaring Brook and the West Branch of the Swift River and consists of a range of grain sizes from well- to poorly sorted gravel to sand and silt, with variable amounts of organic matter. Swamp deposits are found in minor amounts around Dudleyville Marsh, Lake Wyola, and Baker Reservoir, and in other scattered isolated areas. Swamp deposits are usually less than 10 feet thick and consist of dark, decomposed organic matter that is interlayered with sand, silt, and clay.

C.2 Soils

Soils in Shutesbury owe their characteristics to the glacial deposits from which they were derived (see *Soils Map* at the end of this section). Most soils in Shutesbury are shallow-to-bedrock, contain stones, and either are poorly permeable or saturated, or are highly permeable, yet contain a nearly impermeable, fragipan layer close to the surface. All of these characteristics make them less-than-ideal candidates for housing uses (including standard septic system installations), and better suited for forests, pasture, and, in some cases, cropland. The Natural Resources Conservation Service (NRCS) has classified most of Shutesbury as containing soils having severe limitations for building and constructing septic due to excessively slow or excessively fast percolation rates, steep slopes, shallow depths to bedrock, the presence of abundant stones, and shallow depths to the water table. While in most cases these problems can be overcome by constructing raised-bed or oversized leach fields, the need for these measures may limit the extent of future development in town.

NRCS has classified approximately 1,838 acres, or 10.5 percent of the land in Shutesbury as having Prime Farmland Soils on the basis of optimum drainage, permeability and moisture-holding capacity, temperature, length of growing season, slope, pH, acceptable salt and sodium content, and a minimal number of stones. Prime Farmland Soils have the best combination of physical and chemical characteristics for producing an economically sustained, high yield of food, feed, forage, fiber, and oilseed crops when managed according to acceptable farming methods. An additional 4,203 acres, or 24 percent of the land is classified as having Farmland Soils of State and Local Importance, due to their possession of most, but not all, of the same characteristics as the Prime Farmland Soils. For example, these Farmland Soils of State and Local Importance often contain a greater number of stones or lie on terrain having greater slopes. 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.

C.3 Topography

The topography of Shutesbury has been shaped throughout geologic history by a series of tectonic, glacial, and erosional events. Shutesbury is located in the uplands east of the Connecticut River Valley and is characterized by hills averaging 400 feet in elevation and steep-sided stream valleys. Elevations vary from 350 feet above sea level in the southwestern corner of town near Atkins Reservoir, to over 1,000 feet in the January Hills area, to 1,225 feet at the Town Center, to a maximum of 1,305 feet at a location 2 miles north of Town Center on Wendell Road. A north-south trending ridge occupies the eastern half of town and slopes gently north to Lake Wyola and gently south to Pelham. This ridge creates the watershed divide between the Connecticut River Watershed in the west and the Chicopee River Watershed in the east. Along the entire eastern side of this ridge, the elevation drops 500 feet to the West Branch of the Swift River and Quabbin Reservoir. This area contains many brooks, streams and marshy areas that are part of the headwaters of the Quabbin Reservoir. In the northeastern section of town, between Macedonia and New Boston Roads, this ridge splits into two north-south trending ridges. From this steep, eastern ridge, the land slopes continuously and more gradually to the west. The western section of town contains more pronounced hills, including The Plains and January Hills.

D. LANDSCAPE CHARACTER

Shutesbury's landscape is largely composed of steep, heavily forested ridges that slope to the east in the eastern part of town, rolling, wooded hills and flats in the central and western parts of town, and abundant interspersed areas of forested and non-forested wetlands. Most of Shutesbury's rural town roads are lined with stone walls and forest, with occasional houses. Because of the large areas of protected open space that occupy the eastern half of town, residential development is concentrated in the western half in the following areas: Town Center, around Lake Wyola (an area having the highest residential density), the January Hills area, and along the town's major roads (Leverett, Wendell, Locks Pond, Montague, West Pelham, Pelham Hill, and Baker Roads).

Forested areas (both uplands and wetlands) cover approximately 90 percent of Shutesbury's acreage. A high percentage of this land is contained in protected watershed lands associated with the 5,367 Quabbin Reservoir Watershed Lands, the 729-acre Shutesbury State Forest, the 91-acre Lake Wyola State Park, the 2,594 acres owned by W.D. Cowls, as well as several Town-owned conservation areas. The protected Quabbin Reservoir lands provide fishing, nature-watching, and hiking opportunities, as well as the archeological remnants of several former towns abandoned in the 1930s to allow the construction of Quabbin Reservoir. Water and wetlands cover approximately 6 percent of the land surface, and pasture and cropland occupies less than 1 percent. The impervious surface created by buildings and parking is currently limited to around 1.5 percent of the town's surface area.

E. WATER RESOURCES

Shutesbury benefits from a diversity of water bodies, streams, and wetlands that provide wildlife habitat, contribute to drinking water supplies (public and private), provide recreational opportunities, and enhance the town's aesthetics and natural landscapes. The *Water Resources Map* (included at the end of this chapter) illustrates the information pertinent to the OSRP,

including water quality impairments and regulated protection areas. When thinking about potential OSRP projects and action items, particularly projects that increase the town's climate resilience, the information on the *Water Resources Map* can inform discussions about project location, type, and priority.

E.1 Watersheds

Shutesbury lies almost equally in the Connecticut River and Chicopee River Watersheds. The Connecticut is New England's longest river (410 miles) and forms the largest watershed (11,260 square miles), extending into New Hampshire, Vermont, Massachusetts, and Connecticut. The Connecticut River Watershed is also nationally significant: in 1991 Congress established the Silvio O. Conte National Fish and Wildlife Refuge, the only refuge in the country to encompass an entire watershed. In 1998, the Connecticut River became one of only fourteen rivers in the country to earn Presidential designation as an American Heritage River. In 2012, the U.S. Interior Secretary designated the Connecticut River as America's first National Blueway, saying the restoration and preservation efforts on the river were a model for other American rivers. The Chicopee River Watershed is a tributary basin to the Connecticut River from the east and the Connecticut's largest tributary basin, covering a drainage area of 721 square miles.

E.2 Surface Water

The many small mills that once operated in Shutesbury have disappeared but the water still serves as a valuable resource for the people of Shutesbury, Amherst, and metro Boston. Large areas of town are owned and maintained as protected watersheds by public agencies: the Division of Water Supply Protection of the Massachusetts Department of Conservation and Recreation (DCR) who manages the Quabbin Reservoir and the Town of Amherst who manages the Atkins Reservoir. In addition to a large lake, there is a drinking water reservoir, several ponds, numerous beaver impoundments, over a dozen vernal pools certified by the Natural Heritage Endangered Species Program (NHESP), and a number of streams in Shutesbury.

Detailed descriptions of individual sub-watersheds are included as *Appendix A.* Summary descriptions of the sub-watersheds follow below. Within Shutesbury, the Sawmill River, Roaring Brook, Dean Brook, Nurse Brook, Adams Brook, the West Branch of the Swift River, Atherton Brook, Camel Brook, Cobb Brook and Amethyst Brook have been designated by the Massachusetts Department of Fish and Game (DFG) as coldwater fisheries and are considered high-quality trout streams.

E.*2.1 Connecticut River Watershed*

E.2.1.1 Fort River Sub-Watershed

The watershed of Adams Brook, which drains into the Fort River, covers 3,721 acres or 21 percent of Shutesbury and is located south of Leverett Road and west of Pelham Hill Road. Adams Brook, Dean Brook, and Nurse Brook are the three main tributaries. Many forested and non-forested wetlands are located at the headwaters to these brooks. Baker Brook is tributary to Dean Brook and feeds into Baker Reservoir, a 2.7-acre man-made pond located on the southern

side of Baker Road. Nurse Brook feeds into Atkins Reservoir, a 48-acre water body located in the southeastern corner of Shutesbury along Cushman Road that serves as a drinking water supply for the Town of Amherst.

E.2.1.2 Mill River Sub-watershed

The Roaring Brook Sub-watershed drains 2,914 acres or 17 percent of town land. Most of its tributaries are located north of Leverett Road and the main stem runs parallel to Leverett Road where its steep gradient and forested banks provide one of the most scenic landscapes in town on the "S-curves." Both forested and non-forested wetlands and several small ponds are located within this watershed. Roaring Brook has contained a population of native brook trout in the past. Concerns about this area include the impacts of road drainage, road maintenance, and driveway crossings.

E.2.1.3 Sawmill River Sub-watershed

The Sawmill River Sub-watershed covers 2,655 acres or 15 percent of Shutesbury and is located in the northwestern corner of town around Locks Pond Road, Lakeview Road, and the northern ends of Wendell and Montague Roads.

Ames Pond

Ames Pond, a 22-acre man-made water body with a stone dam, is located just east of the southern end of Lake Wyola. The pond is only 5 feet deep at its deepest point. A 35-acre wetland extends northeast from the pond's eastern shore and contains 19.5 acres of forested wetland and 15.5 acres of non-forested wetland, including a spectacular 2-acre natural bog, located directly along the shoreline. Water from an adjacent freshwater marsh drains into Ames Pond. The flow of water out of the marsh has been periodically restricted by beaver dams. Ames Pond drains into South Brook which flows into Lake Wyola. The pond is protected as part of the Kestrel Land Trust property Julian's Bower.

Dudleyville Marsh

The former Dudleyville Ponds off the eastern and western sides of Montague Road were drained several years ago by order of DCR's Office of Dam Safety. The former ponds now consist of 9.25 acres of shallow and deep marsh, with a natural spring and sphagnum bog on the western side and 6 acres of forested wetland along the southern end of the marsh.

Lake Wyola

Lake Wyola, 129 acres in size, occupies much of Shutesbury's northwest corner. The lake has a maximum depth of 33 feet although most of the lake is relatively shallow, with an average depth of only 11 feet. It is used intensively for fishing, swimming, boating and water skiing in the summer and for ice fishing and snowmobiling in the winter. Because Lake Wyola qualifies as a Great Pond, public access is required, with a public boat ramp at the Lake Wyola Conservation Area provided at the southern end of the lake and with the small, municipal Top of the Lake Park and the 40-acre Lake Wyola State Park Recreation Area located on the lake's northern shore. The Lake Wyola Conservation Area has trails that connect to the South Brook Conservation Area.

Town activity at Lake Wyola is managed by the Lake Wyola Advisory Committee. The purpose of the Lake Wyola Advisory Committee is to serve as a liaison between Town government and the lake community, and to promote the preservation, maintenance, and enhancement of the lake as a natural and recreational resource. Its purview includes protection of water quality from septic systems and other sources of contamination, erosion and runoff control, and dam safety. Its functions include, but are not limited to, regular water quality assessment and oversight of the dam.

More than three-quarters of the shoreline of the lake is developed with year-round homes and summer cottages that exist on very small lots that average a quarter acre in size. Each lot has its own septic system, and most of these systems have been in use for many years and were designed before the more rigorous revisions to the State Environmental Code (Title 5) Regulations (310 CMR 15.00) went into effect in 1995. In addition, potential increases in the sizes of dwellings around the lake and associated increases in the number of occupants could result in septic tank overloads and water contamination with fecal coliform.

The results of Lake Wyola water testing over the past 20 years indicate that Lake Wyola's water quality is generally good. In 1998, Lake Wyola had been placed on the 303(d) list of impaired waters by the Massachusetts Department of Environmental Protection (MassDEP), due to elevated levels of phosphorous and noxious weeds. Later, low total phosphorous levels in a 2001 study funded by the Massachusetts Water Quality Initiative confirmed that phosphorous levels were low enough to remove the Lake from the 303(d) listing in 2002. However, the lake has a TMDL and is listed on the 2018/2020 Draft Integrated List of Waters for phosphorus and nutrients/eutrophication. As use of the lake increases seasonally with the summer influx of residents and recreational users, higher levels of nitrogen have been periodically reported. The sporadic beach closures that have occurred at Lake Wyola State Park have resulted not from bacteria loading related to septic systems around the lake but from flocks of geese spending the night at the park's beach. To date, Lake Wyola is currently free of invasive submergent aquatic vegetation, such as Eurasian milfoil, Brazilian waterweed, hydrilla, parrot feather, curly pondweed, and water chestnut, although Eurasian milfoil is present in the "Tri-lakes" region of Belchertown and in Leverett Pond.

The development pressure in the watershed surrounding the lake is the most acute threat to Lake Wyola's water quality, and the Lake Management Committee of the Commonwealth's Water Resources Commission has recommended addressing impacts that might occur within the watershed upstream of the lake. In 2003, a 319 Non-Point Source Pollution Grant was awarded by the U.S. Environmental Protection Agency jointly to DCR, the Town of Shutesbury, the Lake Wyola Advisory Committee, and the Lake Wyola State Park/Ruggles Pond Advisory Board to protect Lake Wyola and its watershed. That project is completed; a detailed survey on non-point source pollution in the watershed is still needed.

Since 1997, the Town has been implementing some recommendations that were provided in a plan entitled *A Management Plan for Lake Wyola* (prepared by New England Environmental, Inc.). Recommendations in this plan included a scheduled lake drawdown every 7 years for aquatic nuisance vegetation control (i.e., non-invasive species); the repair of shoreline structures; the reduction of sedimentation and control of drainage, erosion, and runoff through the proper maintenance of paved and unpaved roads (such as Randall Road, Lake Drive and North Laurel Drive) and provision of drainage enhancements. Some of this recommended work continues to be performed, such as drainage work on Wendell Road. However, the Conservation Commission has

only been in favor of conducting lake drawdowns for dam repairs to protect wildlife species affected by drawdowns.

In 2005 the NRCS prepared a report titled *Lake Wyola Inventory and Evaluation, Shutesbury, MA* that documented erosion from the banks and streambed of Fiske Brook. This erosion issue was partially responsible for sediment accumulation in the lake's north cove as a result of Hurricanes Bertha (1997) and Floyd (1999).

Uncontrolled runoff from 97 acres of sub-watershed on the eastern and northeastern slopes of Morse Hill is currently contributing to erosion problems along Locks Pond Road and within Lake Wyola Association properties and private roadways located along the western side of the lake. This drainage threatens to compromise septic system soil absorption fields in locations that are already taxed by high-groundwater conditions and small lot sizes and may cause sediment deposition and re-suspension in Lake Wyola at areas adjacent to storm drainage outfalls. In January 2007, Scott Campbell, an engineer with DCR, evaluated stormwater issues on the western side of the lake and created a draft report listing some suggested improvements and mitigating measures. The report, titled *Locks Pond Road and Lake Wyola Subwatershed Stormwater Improvement Study, Shutesbury, Massachusetts*, recommended the use of water bars, asphalt berms, bioretention areas, extended detention ponds, rain gardens, leaching basins, and rain barrels (to control roof runoff). The report also recommended changing road cross-sections to increase crowns, stabilizing roadside ditches with turf-reinforced, mat-linings, and increasing channel cross-section widths to allow conveyance of greater flows. All proposed measures would be designed to divert, store and infiltrate storm-water runoff and remove excessive sediment loads. Yet many of these measures require regular maintenance to remain effective, some require acquisition of easements on undeveloped private land in order to construct some of the stormwater management structures, and all would require homeowner understanding of the structures' proper functioning. Furthermore, funding is required to construct and properly maintain any and all of the drainage improvements. All of these constraints pose challenges to project implementation.

E.2.2 Chicopee River Watershed

The Shutesbury portion of the Quabbin Reservoir Watershed occupies 7,862 acres or approximately 45 percent of town land. DCR's Division of Water Supply Protection owns 5,098 of these acres, 4,147 of which are Off-Reservation Lands, managed by the DCR Division of Water Supply Protection outside the bounds of the Quabbin Reservation (which in Shutesbury is all DCR-owned land west of Route 202). The Quabbin Reservoir occupies a total of 24,700 acres (38.6 square miles), of which 138 acres and 2.7 miles of its shoreline are located within the eastern edge of Shutesbury proper.

Rocky Run and Camel Brook drain into the West Branch of the Swift River in the north-central and east-central sections of town, respectively. Both brooks contain forested wetlands at their headwaters. A small pond is located at Rocky Run's headwaters. The West Branch of the Swift River contains both forested and non-forested wetlands at several locations throughout its length within Shutesbury.

Cobb Brook, Atherton Brook (and its tributaries Town Farm Brook and Osgood Brook), and Briggs Brook drain land in the extreme southeastern corner of town and empty into the Quabbin

Reservoir. Forested wetlands exist along Town Farm Brook and Osgood Brook. Osgood Brook and Briggs Brook have small ponds located at their headwaters. In addition, Osgood Brook drains a non-forested wetland.

The West Branch of the Swift River, surrounded by numerous forested wetlands and some non-forested wetlands, empties into the Quabbin Reservoir. The West Branch contains both a native brook trout population and a group of sensitive invertebrates that are indicative of high water quality and the absence of pollutants. Annually stocked with brook trout, the Swift West Branch is a popular fly-fishing area in the fall.

E.3 Protected Surface Waters, Watershed Areas and Wetlands

A number of state laws and regulations protect surface water, watershed areas, and wetlands in Massachusetts. The Massachusetts *Surface Water Quality Standards* (314 CMR 4.00) implements provisions of the federal Clean Water Act by designating the most sensitive uses of Massachusetts waters and providing criteria for evaluating water quality to support those uses.

E.3.1 Public Drinking Water Reservoirs

Receiving the highest scrutiny under the Surface Water Quality Standards are public water supplies and their tributaries and waters designated as excellent habitat for fish and other aquatic life for their reproduction, migration, and growth. These waters are protected as Outstanding Resource Waters and cover a considerable percentage of Shutesbury's land area (more than half the land area in a north-south direction) since the Quabbin Reservoir and its tributaries, the Town of Amherst's Atkins Reservoir and its tributaries, and Amethyst Brook are all classified as Outstanding Resource Waters. A 401 Water Quality Certification must be obtained for any discharge of dredged or fill material to a water source in the Commonwealth, and these regulations set strict limits on alterations to Outstanding Resource Waters.

Public drinking supply watersheds are regulated by the Massachusetts *Drinking Water Regulations* (310 CMR 22.00). Drinking water regulations designate three surface water protection areas—Zones A, B, and C—in which certain activities are prohibited (see *Appendix A* for definition of those zones).

The Massachusetts *Watershed Protection Act regulations* (313 CMR 11.00) pertain to land uses and activities on privately owned lands adjacent to certain mapped tributaries and surface waters and to their associated bordering vegetated wetlands and floodplains within the Quabbin Reservoir watershed to protect the quality of the drinking water supply. A substantial portion of the lands on Shutesbury's eastern slope are regulated by these regulations.

E.3.1 Wetlands

Both forested and non-forested wetlands exist along Shutesbury's rivers, streams, lakes, and ponds, including many headwater areas. These wetlands provide flood control and prevent storm damage, filter pollutants to protect surface and groundwater supplies, and provide wildlife and fishery habitat.

The *Wetlands Protection Act (WPA) Regulations* (310 CMR 10.00) protect not only wetlands**,** but other resource areas such as land subject to flooding (100-year floodplains), land under water bodies, and waterways. The Town of Shutesbury has a local *General Wetlands Protection Bylaw* that creates a 100-foot buffer from any wetland, waterbody, or land subject to flooding. Its regulations, administered by the Conservation Commission, provide some resource areas with greater protection than regulations of the state's Wetlands Protection Act.

Since most of Shutesbury's streams are not considered navigable, the *Waterways Regulations* (310 CMR 9.00) apply chiefly to regulated activities within Lake Wyola. All perennial streams receive protection under the *Rivers Protection Act* of 1996, which requires a 200-foot Riverfront Area protective buffer. Details of these regulations and more information about the resource areas they protect are included as *Appendix A.*

E.4 Vernal Pools

There are 14 NHESP-certified vernal pools throughout town; an additional 32 potential vernal pools have been identified by NHESPThese temporary pools provide essential, predator-free breeding habitat in the spring for several amphibian species, including several state-listed species. Certified Vernal Pools are afforded special protection under the WPA Regulations, and the under the *Forestry Cutting Practices Act* (MGL Ch. 132 s. 40-46) and the *Forestry Cutting Practices Act Regulations* (304 CMR 11.00). Under the WPA Regulations, the vernal pools and a 100-foot zone around them are subject to regulatory review. Any project proposed within a vernal pool or within 100 feet of a vernal pool cannot result in an impairment of its capacity to provide wildlife habitat functions such as food, shelter, migratory and breeding areas, and overwintering areas for amphibians. Since the topography, soil structure, plant community composition and structure, and hydrologic regime of vernal pool habitat provide these wildlife habitat functions, any alteration of these areas that would affect these characteristics is disallowed.

E.5 Groundwater

E.5.1 Drinking Water Supply

Because Shutesbury's water supply is restricted to groundwater and most of Shutesbury is serviced by private wells, groundwater is a vitally important town resource. Research on aquifers in Shutesbury has been limited, with knowledge restricted to several USGS hydrogeologic studies that were performed in the 1970s and 1980s and the preliminary surficial geology study that was done in 1978. The hydrogeologic studies are: *Groundwater Availability in the Northern Part of the Connecticut Valley Urban Area, Central New England,*[13] *Map Showing Availability of Ground Water in the Connecticut River Lowlands, Massachusetts,*[14] and *Water Resources of the Chicopee River Basin, Massachusetts*.[15] Although general in their scope and level of detail, these resources may be used to get a rough idea of the types of aquifers present in town and the maximum yields that realistically could be obtained from these aquifers under optimum conditions. In addition,

[13] Frimpter, Miscellaneous Investigation Series I-1074-I, 1980
[14] Walker and Caswell, Hydrogeologic Investigations Atlas HA-563, 1977
[15] Krejmas and Maevsky, Hydrogeologic Investigation Atlas HA-693, 1986

MassDEP files on the town's six public water supply wells provide supplemental information concerning the bedrock aquifer. Shutesbury Board of Health records on private wells and records contained in MassDEP's SearchWell database may provide additional, but limited, information on well depths, formation yields, etc.

The Town's Water Resources Committee (WRC) was convened in 2011 at the request of the Selectboard and has assembled what information is currently available on groundwater sources in town. In late 2014, the WRC installed four paired monitoring wells throughout Shutesbury in order to evaluate the health and long-term sustainability of the bedrock aquifer. At each location, a deep well (at a minimum of 100 feet) was drilled into the bedrock, and a companion shallow well (drilled through the soil layers to the top of the bedrock) was installed close by. Automatic data loggers installed in each well measure and store water level data at pre-set intervals, allowing the WRC to track both seasonal and long-term water level changes in both the bedrock and surficial geologic layers. Wells exhibit seasonal fluctuations but appear to recover each winter and spring, and data show no trends of progressive lowering in regional water levels. Notably, the wells showed extra lowering during the 2018 drought year, but lowering was not excessive and the wells recovered in the following year. The WRC is no longer active, but data collection continues.

As previously noted, stratified drift is relatively rare in Shutesbury. Stratified drift deposits in town are estimated to range in thickness from 0 to 50 feet. The highest yields of groundwater would come from shallow aquifers where deposits are thickest, coarse-grained, and lie near large streams. These stratified drift deposits are located in the areas north, east and southeast of Lake Wyola (including a zone surrounding Ames Pond); in a zone surrounding the Dudleyville Marsh; along the central and southern portions of the West Branch of the Swift River; around portions of Quabbin Reservoir; along Roaring Brook; along Dean Brook; around Baker Reservoir; and in the area north of Atkins Reservoir and along Adams Brook south of Atkins Reservoir.

Till forms a widespread, but discontinuous blanket over bedrock in the uplands and lies below stratified drift in the lowlands and valleys. In favorable locations, large-diameter (i.e., 36-inch) wells in till can yield as much as 10 gallons per minute. Such large-diameter wells were used in the past but have been phased out in most areas in favor of bedrock wells, since most of these wells did not yield enough water to supply modern homes.

Because of the limited distribution of the stratified drift deposits, most wells in Shutesbury tap the bedrock aquifer. However, since no detailed hydrogeological studies have been completed to date, little information is available on the structure of the aquifer, potential yields, or well construction requirements other than from well driller's records for private wells or other data on file for some of the town's public water supply wells. Information for over 500 private wells contained in MassDEP's Well Drillers Certification Program SearchWell Database indicates that most private wells in town range in depth between 150 and 400 feet, although there are a few that are very shallow (ranging from 14 to 80 feet deep) and several that are very deep (ranging in depth from 500 to 750 feet). By virtue of the proximity of the water supply to the ground surface, the shallow wells are more susceptible to contamination from bacterial and chemical sources that may exist near the wellheads. Bedrock is exposed at the surface in many locations, especially in the higher-elevation areas in the eastern half of town, but it is generally covered by 1 to 100 feet of surficial deposits. The permeability in bedrock at a well location is controlled by the number, size, orientation, and interconnectivity of the fractures, and may vary greatly from one location to the next, even over short distances. Fracture studies of the bedrock aquifer would yield important

information concerning these characteristics. Relative to sedimentary rocks, the permeability of crystalline rocks (such as those underlying Shutesbury) is low and decreases with depth. Most water-saturated fractures in these types of rocks are located within 500 feet of the ground surface. Most homes, businesses, and schools requiring small amounts of water use bedrock wells. Records in MassDEP's SearchWell Database indicate that during pumping tests, yields from Shutesbury's private wells ranged from 0.25 to 300 gallons per minute (gpm), averaging 13 gpm. However, 61 percent of the private bedrock wells in town yield less than 10 gpm. Yields at the public water supply wells in bedrock in Shutesbury are actually much lower and range from 0.70 to 5.25 gpm. Wells pumping less than 0.5 gpm are considered by MassDEP to be marginally dependable sources of water for domestic use.

Public water supply wells are located at the Shutesbury Elementary School, the Sirius Community, the Shutesbury Athletic Club, Lake Wyola State Park, and at the Pine Brook Camp and Conference Center. These five water supplies are regulated by MassDEP as public water systems because they serve water for human consumption to an average of at least 25 individuals daily, for at least 60 days of the year. Shutesbury Elementary School has two public water supply wells, though Well 01G is designated for approved emergency use only. Depth ranges from 140 to 440 feet in the three wells whose depth is known.

Although it is unlikely that bedrock wells in a number of locations could ever serve as community water supplies due to their relatively low yields, extended-duration pump tests are needed to evaluate sustainable yields, particularly of the bedrock aquifer. Because of their higher permeability and potential yields, the stratified drift deposits would be better candidates for siting community water supply wells, although their limited horizontal and vertical extents and the limited sizes of their recharge areas make this possibility unlikely, particularly since the more horizontally extensive deposits are located in the most developed section of town (i.e., around Lake Wyola). Although the Town may wish to focus some of its future land acquisition efforts on some of the areas containing stratified drift deposits, detailed evaluations of the saturated thickness of the deposits and sizes of the recharge areas at potential well locations within the stratified drift aquifer should be made first to determine if these areas are likely as potential future community water supplies. If not, and unless these areas have additional values to offer, such as protecting unique or endangered species habitats, protecting surface water supplies, maintaining wildlife corridors, etc., then it may be more valuable to concentrate future land protection efforts on other areas of town that provide more benefits.

E.5.2 Drinking Water Quality

According to the MassDEP Drinking Water files, routine water samples collected over a number of years from Shutesbury public water supply wells (from 7 to 14 or more years depending upon the date of system registration) indicated that there have been no exceedances of drinking water standards for fecal coliform or any other of the sampling parameters, such as nitrate and sodium. Manganese has been recently added to list of water quality parameters required to be tested, and those concentrations have been below health advisory levels, as well. In 2017, testing found an excess of sodium in the Town Hall kitchen (which has not been certified for use as a kitchen since at least 1990), as well as chloride, sediment, and total dissolved solids that exceeded DEP drinking water standards. The Town Hall faucets were posted and the Town provides bottled drinking

water.[16] The Shutesbury Elementary School is subject to additional sampling requirements because it serves water to at least 25 of the same persons, at least 4 hours per day, at least 4 days per week for at least 6 months of the year. Water at the Shutesbury Elementary School has also been tested for lead and copper, volatile organic compounds, and perchlorate, and all samples have tested below drinking water standards. Although not an absolute indicator of the water quality in any particular private well, these results suggest that at the present time, groundwater is generally of good quality in the areas of Shutesbury where these public water supply wells are located.

When the WRC convened in 2011, it also collected samples from private wells. Testing showed water chemistry was good regarding lead, arsenic, and water hardness (there was no testing for PFAS chemicals[17] or VOCs[18]). In 2021, voluntary PFAS testing was conducted as part of the MassDEP Private Wells PFAS Sampling Program. A number of private well clusters were found to have low to moderate levels of PFAS.

E.6 Flood Hazard Areas

Flood zones are geographic areas defined by the Federal Emergency Management Agency (FEMA) according to varying levels of flood risk. These zones are depicted on Flood Insurance Rate Maps (FIRMs) with each zone representing a different level of severity of flooding. Although a number of counties in Massachusetts have updated floodplain mapping data available, all of Franklin County's FIRMs date back to around 1980. Shutesbury's June 18, 1980 map therefore contains only the following designations for flood hazard areas: Zone A (100-year floodplain), Zone B (500-year floodplain), and Zone C (areas of minimal flooding above the 500-year flood level). Lake Wyola is the only area in town that is mapped as Zone A. The relatively limited distribution of flood hazard areas in Shutesbury is not surprising. Because most of Shutesbury's streams and rivers flow through hilly terrain, the steep-sided walls of the stream valleys generally contain floodwaters. Furthermore, the steep nature of the terrain abutting most of these streams makes these areas unsuitable for residential development. Though the topography helps limit flood impacts, if Shutesbury's steep-banked headwater streams are disconnected from their floodplain as a result of historical channelization or deforestation, these conditions can increase the volume and velocity of floodwaters in a way that exacerbates flood damage downstream.

Because Shutesbury participates in the National Flood Insurance Program, mandatory flood insurance purchase requirements apply to residents in Zones A1 and A. Historically, most of the 100-year floodplain areas in town are confined to the areas around the major surface water bodies and constrained to very narrow zones around those water bodies, so flood damage has typically been minimal. However, under conditions created by climate change, flood inundation hazard areas are likely to get larger. In the case of Atkins Reservoir, no housing is allowed around the area because it is a public water supply. Similarly, the West Branch of the Swift River is an uninhabited area. Flood events at Lake Wyola have not occurred during the lifetimes of any

[16] Shutesbury Board of Health. "Information on the well water at Town Hall, April 2017," https://www.shutesbury.org/health

[17] Per- and polyfluoralkyl substances (PFAS) are man-made chemicals (including PFOA, PFOS, GenX, and others), also known as "forever chemicals", that persist in the environment and human body and are hazardous to human health. PFAS are found in a wide range of ordinary consumer products and in drinking water.

[18] Volatile organic compounds (VOCs) are chemicals emitted as gasses from certain solids or liquids, including drinking water.

Shutesbury residents who are alive today. Although the expected lateral extent of flooding around Lake Wyola would be minimal, as described above, both the dam and the manually operated gate valve allow for the release of the additional water volume necessary to mitigate any potential flooding that might occur in the absence of such structures. It is also important to note that, although the Sawmill River has shown little flood hazard risk under current conditions with an intact Lake Wyola Dam, downstream areas would undoubtedly experience at least temporary flooding if the dam were to break. A failure of the McAvoy Pond dam, upstream of Lake Wyola in Wendell, would trigger the Lake Wyola Emergency Plan.[19]

Though no major flooding has occurred in Shutesbury in recent decades, even after the heavy rainfalls of Tropical Storm Irene (2011) and Hurricane Sandy (2012), participants in Shutesbury's 2020 MVP workshop pointed out that while the town used to get two inches of rain over two to three days, it now happens over the span of a few hours, which is "devastating to infrastructure" and causes roadway flooding and high levels of roadway runoff. They noted that heavy precipitation events can cause extensive erosion on the roadways, causing gravel to migrate with runoff to enter culverts and drinking water wells and water to pool on nearby properties. As climate change brings increased frequency and intensity of storms, as well as overall increases in annual precipitation, these flooding and runoff-related problems may be exacerbated in the future.

E.7 Active River Areas and River Corridor Mapping

Rivers and streams are dynamic systems in a constant state of change. Fluvial erosion is a natural process entailing the wearing away of soil, vegetation, sediment, and rock through the movement of water in rivers and streams. While erosion is a natural process, the rate of erosion is affected by human alterations of river channels or land as well as a changing climate. Buildings and roads are sometimes located too close to riverbanks and areas of active river processes, making banks vulnerable to erosive forces while at the same time increasing the rate of erosion within the river corridor due to loss of flood storage in the floodplain. The most severe fluvial erosion events in recent years have resulted from heavy rain, such as Tropical Storm Irene in 2011, which washed out roads across Franklin County and destroyed several buildings.

River corridor mapping delineates the areas vulnerable to fluvial erosion, including the river, its banks, and the land close to the river that carries floodwaters and accommodates the meander pattern or movement of the river. Land within and immediately abutting a river corridor is therefore likely to be at higher risk of fluvial erosion during floods. As of 2021, only a few communities in Franklin County had mapped river corridors.

The Franklin Regional Council of Governments (FRCOG) developed a draft model bylaw that could be used in conjunction with river corridor mapping in a community. The objective of a River Corridor Protection Overlay zoning bylaw is to guide and encourage measures within the active river area that provide increased protection to property and infrastructure while maintaining and restoring the health of river systems. Communities that have completed river corridor maps can

[19] Town of Shutesbury and Franklin Regional Council of Governments. *Town of Shutesbury Hazard Mitigation Plan* (2021): https://www.shutesbury.org/

assess their risk to fluvial erosion hazards and consider adopting a River Corridor Protection Overlay Bylaw, using the model as a guide.[20]

F. VEGETATION

F.1 Brief Description of History and Diversity of Vegetation in Shutesbury

At present forest dominates Shutesbury's landscape, yet Shutesbury has not always been a forested town. An 1830 survey of the extent of forest in all towns of the Commonwealth indicated that only a small percentage of Shutesbury was forested. Photographs of the town taken in the 19th century show few trees and numerous panoramic views resulting from abundant agricultural activity. The stone walls and foundations deep in the woods are evidence of the once more open and agricultural landscape of Shutesbury. Even forest that existed through the period of agricultural development was most certainly harvested periodically for timbers and fuel wood. Most of the forest in town today is the result of the natural succession from fields and pastures to forest, with dense white pine stands often developing in the abandoned agricultural fields. Much of this pine, however, was harvested near the turn of the 20th century, frequently to provide lumber to the pine-box industry. In addition, some trees in Shutesbury probably would have been harvested for the charcoal industry in the abutting town of Leverett, since that industry consumed enormous quantities of wood. The forest that subsequently developed in harvested areas was generally dominated by hardwoods. Further changes to the forest structure occurred when the chestnut blight struck North American forests early in the 20th century, virtually wiping out the American chestnut, historically the dominant hardwood tree in northern forests. As a result of all of these changes, while most of Shutesbury is dominated by forest today, virtually none of this forest is representative of the original conditions that existed prior to European settlement.

Non-forested areas are relatively rare in Shutesbury today. Cropland, pasture, hayfields, and power line clearings account for most of the open land, along with some abandoned fields and sandy areas. In what is otherwise a densely forested town, these open areas provide important visual diversity, relatively unique wildlife habitat (including "edge zones" that are important to a number of species). According to the Town's 2004 Master Plan, because "many of the most rapidly declining species in the northeast are associated with the early successional habitat of grassland, shrublands and young forestland that were more abundant in the nineteenth century" open areas in town are worthy of protection.[21] To this end, "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."[22]

Old fields returning to forest offer a rich and relatively unusual habitat. Under such conditions, pioneer tree species, which require a great deal of sunlight but germinate quickly, take root, and

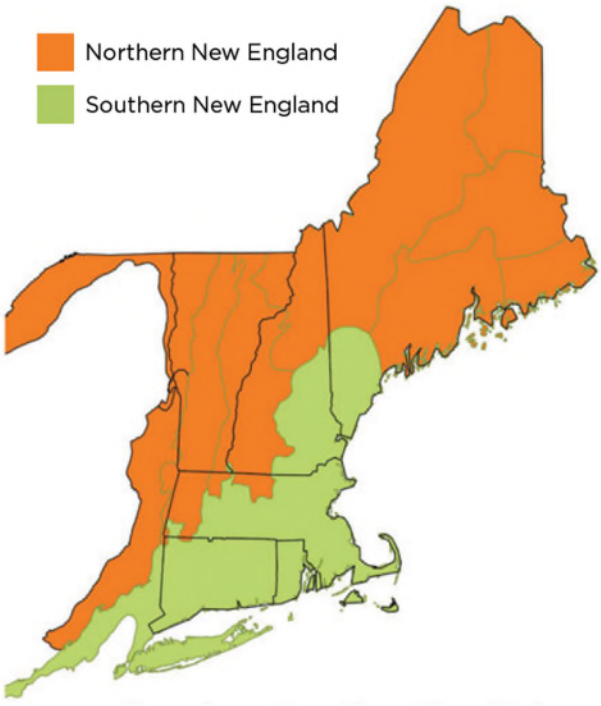
[20] For more details, see https://frcog.org/river-corridor-toolkit-released/
[21] Berlik et al, 2002
[22] Town of Shutesbury. *Shutesbury Master Plan*, 2004

spread throughout the fields when mowing and plowing activity ceases. Typically, speckled alder, white pine, gray birch, wild cherry, sassafras, and other fast-growing trees establish dominance, while shrubs and herbaceous plants such as lowbush blueberry, raspberry, meadowsweet, and goldenrod fight with invasives such as Russian olive and mulitflora rose to establish a toehold in the fields. Left undisturbed, the trees will eventually shade out many of the sun-loving smaller plants and the forest will reestablish itself. Most pioneer tree species, however, such as white pine, alder, cherry, and gray birch, will eventually die off as larger trees grow and prevent much of the sunlight from reaching the understory. In this manner, the pioneer species give way to hardwood species such as oaks and maples that require less direct sunlight to germinate and grow.

The majority of wetlands in town are forested, commonly consisting of an evergreen or evergreen/deciduous mix. The most dominant evergreen in 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 around the edges of water bodies, and include deciduous shrubs such as red maple, speckled alder, winterberry, highbush blueberry, red-osier and silky dogwoods, wild cranberry, button bush, and viburnums. In bogs, bog laurel, sweet gale, leatherleaf, cranberry, and cotton grass are also present.

In Shutesbury, a variety of herbaceous plants grow in the understory of forests, in the fields, and in the wetlands. These include sedges, grasses, mosses, ferns, emergent and submergent aquatic vegetation, and a variety of wildflowers. The list of these plants is too long to include here, but some of the more unusual and interesting plants known to grow in Shutesbury that are worthy of mention are the round-leaved sundew, pitcher plants, cotton grass, purple fringed orchis, pink lady slipper, and the fringed gentian. Shutesbury also contains a number of species of fungi (i.e., mushrooms) and lichens (composite, symbiotic organisms composed of fungi and either green algae or cyanobacteria, previously known as blue-green algae).

Figure 4-4: Northern and Southern New England Ecoregions



Shutesbury is located in the Northern New England ecoregion, on the border of the Southern New England ecoregion. (Source: Catanzaro, Paul, Anthony D'Amato, and Emily Silver Huff, *Increasing Forest Resiliency for an Uncertain Future*, (2016): https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf.)

F.2 Forests

Forest areas are considered the town's most abundant natural resource. As of 2016, according to MassGIS, forests covered 89 percent of the town's total land area.

Shutesbury lies in the transition zone between southern and northern New England forest type zones (see Figure 4-4). Evergreen forests of pine and hemlock dominate the lowland and riparian areas north and east of Atkins Reservoir; the areas along Dean Brook, Baker Brook and Roaring Brook; the area northeast of the Dudleyville Marsh and eastward to South Brook; and the area southeast of Ames Pond. Deciduous forests dominate uplands and drier, south-facing slopes on the north-south trending ridge located in the center of town and along the Leverett town line, just north of Leverett Road. The forests today are dominated by red oak, black oak, red maple, white pine, eastern hemlock, and black birch. American beech, white birch, yellow birch, sugar maple, quaking aspen, white ash, white oak and black cherry are also present. In addition, pioneer species, such as alders and gray birch, are often present in areas that have opened up when trees have fallen or been cut. Mountain laurel, witch hazel, highbush blueberry, lowbush blueberry, sassafras, and other shrubs comprise the understory in many places.

Forests play a critical role in mitigating future climate change. Forests sequester and store carbon in tree roots, stems, branches, and leaves, and in forest soils. Climate change is also impacting forests in many ways: a longer growing season and increasing temperatures are shifting habitat conditions for trees northward and to higher elevations. Over time, the birch-beech-maple forests typical of northern New England will decline while oak-hickory forests more typical in southern New England will thrive. An expected increase in periods of drought between intense precipitation events may weaken trees, leaving them more susceptible to insects and disease. Warmer temperatures may favor invasive plants over native species and are already resulting in widespread damage from pests and disease that in the past were kept in check by colder temperatures.

Thus, in contrast to the forces that shaped Shutesbury's forests in its past, the major current threat to the forest is climate stress and forest insect pests, which could decimate a large portion of the mixed-woods forest. The 2016 publication "Increasing Forest Resiliency for an Uncertain Future" by researchers from UMass Amherst, the University of Vermont, and the U.S. Forest Service focuses on addressing the impacts of various stressors on New England's forests and offers recommendations for foresters, conservation groups, landowners, and municipalities on how to increase forest resilience in an uncertain future (see *Appendix A* for more details on forest health and resilience from "Increasing Forest Resiliency for an Uncertain Future"). [23]

In 2012, the Massachusetts Department of Conservation and Recreation (DCR) adopted landscape designations for the State and urban parks system, including State Forests owned by DCR. The landscape designations are based on the Forest Future Visioning Process, a statewide public outreach process completed in 2009 and 2010 that resulted in forest stewardship and management recommendations for DCR lands. The three landscape designations — reserves, woodlands, and parkland — have different management goals and guidelines:

> Reserve: The least-fragmented, forested areas where ecological processes will predominate and inform management, and where commercial timber harvesting is not allowed.
>
> Woodland: Forested areas actively managed for forest health, resource protection, sustainable production of timber, and recreation.

[23] Catanzaro, Paul, Anthony D'Amato, and Emily Silver Huff. *Increasing Forest Resiliency for an Uncertain Future*, 2016: https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf

Parkland: Areas providing public recreation opportunities, connections to nature, and protection and appreciation of natural and cultural resources.[24]

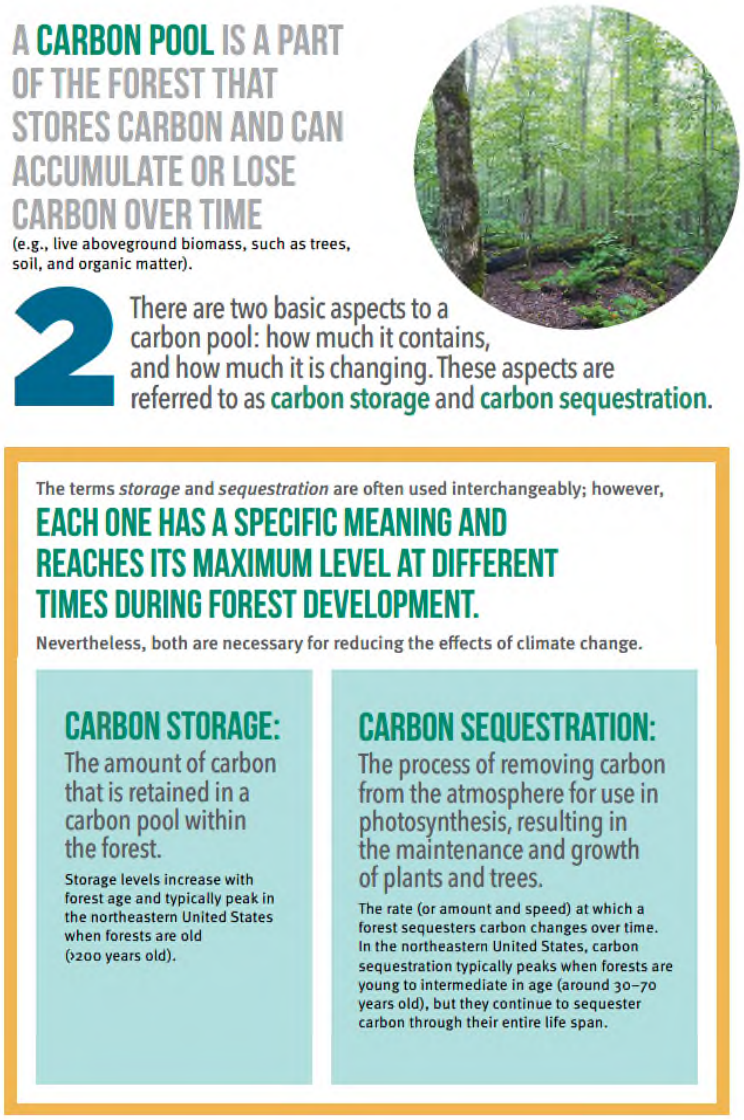
Shutesbury State Forest is designated Woodland, and the Lake Wyola State Park Parkland. The Town receives PILOT (payment in lieu of taxes) payments from the state annually, although the program is undermined by lack of funding and unclear tax rulings.[25]

F.3 Forests' Role in Sequestering and Storing Carbon

As forests grow, they remove (sequester) carbon dioxide from the atmosphere and store it within forest biomass and soils. Thus, forest growth plays an important role in combatting climate change. Currently, carbon sequestration in Massachusetts forests offsets about 14% of annual emissions in Massachusetts.[26]

As Figure 4-5 shows, forest carbon includes both the carbon stored in the forest – in trees, plants, leaves, roots, soils, and dead trees – as well as carbon sequestration, the rate at which a forest removes carbon from the atmosphere. The amount of carbon stored or sequestered in any given forests depends on the forest age, tree species, soils, past land use, and any natural or human disturbances. Generally speaking, younger forests (30 – 70 years old) maximize carbon sequestration, as trees are growing fast during this stage and have access to light

Figure 4-5: Carbon Storage and Sequestration



Source: *Forest Carbon: An Essential Natural Solution for Climate Change*. UMass Amherst and University of Vermont. https://masswoods.org/caring-your-land/forest-carbon

[24] Massachusetts Department of Conservation and Recreation *Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines*, 2012: https://www.mass.gov/files/documents/2016/08/qq/management-guidelines.pdf

[25] Office of the State Auditor. "Pilot Programs Undermined by Lack of Funding and Tax Rulings, Report Finds", 2020: https://www.mass.gov/news/pilot-programs-undermined-by-lack-of-funding-and-tax-rulings-report-finds

[26] MassAudubon: "Forest Management": https://www.massaudubon.org/our-conservation-work/ecological-management/habitat-management/forest-management

and space. As forests age, growth and sequestration rates slow, but the total amount of carbon stored in the forest increases more with age. Carbon stored in old growth forests, for instance, ranges form 100 – 120 metric tons per acre, while most forests in our region at around 100 years old store between 60 – 80 metric tons of carbon per acre.

Multi-aged forests, where small disturbances over time have opened the canopy in some areas while other areas have continued to age, contain a mix of both characteristics, balancing carbon storage and sequestration. This type of multi-age structure can be accomplished within a forest under one ownership, or on a larger scale throughout a region, by landowners choosing passive and active approaches to managing forestland. Local wood products like lumber, furniture, and flooring provide a carbon benefit as well, if harvested from forests that are sustainably managed. Local wood products store carbon for the life of the product, and are an environmentally friendly alternative to other building materials that have higher embodied carbon.

F.4 Public Shade Trees

In Massachusetts, all shade trees existing within the boundaries of a public way or in other public areas such as parks and cemeteries are protected by law. In many communities, public shade trees exist as regal, old trees lining municipal roads that provide shade and aesthetic variation in expanses of flat, mowed lawns. By contrast, in Shutesbury public shade trees tend to blend in with adjacent forest trees in most areas, except in Shutesbury Center. Some regal, old trees exist in a few areas and these are cherished by residents along with the rest of the forest.

The ice storm of 2008, which left the town without power for more than a week, and subsequent severe weather events, including Tropical Storms Irene and Lee and the October snowstorm in 2011, have had a significant impact on the town's public shade trees and forest. Since 2008, many 80-foot-tall white pine trees in the old cemetery on Leverett Road are now gone — either felled by storms or by preventative removal. The vulnerability of trees to storm events can be exacerbated by the weakening of trees due to pest damage, climate stress, and drowning of tree roots by stormwater runoff. In addition to a storm's direct damage, the preventative clearing of trees and branches overhanging roads and electrical lines by utility companies meant that many of the tree-canopied roads have been opened up to the sky. Although clearing was done to prevent public safety emergencies caused by power outages, such work changed some of the rural character of these roads.

In addition to natural events, work to widen Town roads requires removal of public shade trees, as in the 2006 Leverett-Cooleyville-Prescott Footprint Road Project. A group of large public shade trees on the Town Common was removed from the corner of Prescott and Cooleyville Roads in 2011 to improve public safety at that intersection. Due to National Grid's 2020 preemptive trimming for hazard removal, considered "aggressive" by many, the 2020 MVP workshop summary recommended as a moderate priority that the Town develop a "comprehensive tree and forests management plan to identify, remove, and replace problem trees, preserve intact forests, provide guidance and resources for gradually moving toward more climate-resilient trees and forest communities, and develop guidelines to manage conversion of

forest land (e.g., solar guidelines)."[27] Another way to reduce the impact of storms on public shade trees is to underground utilities, but this is an expensive option not supported by utility companies.

F.5 Interior Forest Blocks and Forest Cores

Interior forests in Massachusetts — forest blocks ranging in size from 10 to 8,600 acres — greatly increase the ability of ecosystems to recover from changes and disturbances and allow species richness to be maintained by providing connected habitats and protecting vulnerable species from edge effects. The 2004 Shutesbury Master Plan states that the Franklin County Contiguous Forest by Forest Acreage Map shows that "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. […] Another 10,000-acre block of contiguous forest lies southeast of Rte. 202 and runs into New Salem. […]." Another large block of contiguous forest (5,000 to 10,000 acres in size) lies west of Montague Road. This forest block includes Brushy Mountain, the area in Shutesbury known as the Plains. 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.[28] The Brushy Mountain and the Cooleyville Road blocks have been identified as Forest Cores on the BioMap2 (see *Vegetation and Wildlife Map* at the end of this section).

A number of government agencies and conservation groups are also recognizing the need to protect "interior forest cores" in order to promote the development of late successional structural elements, such as large living and dead trees, cavity trees, and downed woody debris that are important for sustaining native forest biodiversity and maintaining ecosystem services like carbon sequestration. Since most forest stands in the Northeast are younger than 100 years, it is estimated that it will take at least another 50 to 100 years for any of these forests to reach late successional stages. In such old growth forests, vegetative diversity even carries over into the streams that run through the forests.[29] The Commonwealth of Massachusetts has recommended a limited number of forest reserves of 5,000 acres or larger on state lands to represent the diversity of ecosystems. Such areas would be buffered from human development by working, managed forestlands located outside the reserves. No such reserves have been designated in Shutesbury.

F.6 Rare Plants, BioMap2 Core Habitats, and Exemplary Natural Communities

The Massachusetts Natural Heritage Atlas contains maps of Priority Habitats[30] for state-listed plant species protected under the *Massachusetts Endangered Species Act* (MGL Ch.131A), the *Massachusetts Endangered Species Act Regulations* (321 CMR 10.00), the Massachusetts *Environmental Policy Act* (MEPA; MGL Ch. 30 s. 6162H), and the *Forestry Cutting Practices Act Regulations* (304 CMR 11.00). Priority Habitats are based on the known geographical extents of

[27] Fuss & O'Neill. *Town of Shutesbury Community Resilience Building Workshop Summary of Findings*, 2020: https://www.shutesbury.org/sites/default/files/8.5x11_Draft_CRB_Report_Shutesbury_20200616_Optimized%20(3).pdf

[28] Town of Shutesbury. *Shutesbury Master Plan*, 2004

[29] Foster et al, 2010

[30] Priority Habitats for State-listed Species: https://www.mass.gov/service-details/regulatory-maps-priority-estimated-habitats

state-listed rare species. In Shutesbury, Priority Habitats are found on Lake Wyola and Ames Pond, along the Quabbin Reservoir, and in the southeast of town north and west of Atkins Reservoir. Any non-exempt activities proposed within a Priority Habitat are subject to regulatory review by NHESP to determine if they would result in a "take" of state-listed species. Relative to plants, a "take" means to collect, pick, kill, transplant, cut, or process. Few exceptions are allowed. Although there are strong penalties for takes, alterations to Priority Habitats may occur, whether deliberate or unintentional, since proponents may be unfamiliar with the regulatory requirements. NHESP reviews timber harvesting projects when treatment areas coincide with Estimated Habitat and/or Priority Habitat. The review determines whether the proposed activities will result in harm to state-listed rare species or their habitats. Forestry projects are exempt from the standard MESA project-filing requirements, provided they have an approved Forest Cutting Plan as required under the Forest Cutting Practices Act (MGL Ch.132). However, municipal boards such as Conservation Commissions have no regulatory authority concerning alterations to rare plants or non-wetland wildlife and may have little or no familiarity with specific requirements of the Massachusetts Endangered Species Act (MESA).

NHESP has developed and periodically updates the Massachusetts List of Endangered, Threatened or Special Concern Species. Endangered species (E) are those in danger of extinction throughout Massachusetts or throughout all or part of their ranges. Threatened species (T) are those that are likely to become endangered in the foreseeable future, those that are declining, or those that are rare. Special Concern (SC) species are species that have suffered a decline sufficient to threaten the species if allowed to continue unchecked, or species that occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened in the state. According to NHESP, there are very few known rare plant species in Shutesbury. NHESP has listed four Threatened or Endangered plant species as occurring in Shutesbury: Tuckerman's Pondweed (T) (Potamogeton confervoides, last observed 2013), variable sedge (E) (Carex polymorpha, last observed 2017), dwarf rattlesnake plantain (E) (Goodyera repens, last observed 1925), and ovate spike-sedge (E) (Eleocharis ovata, last observed 1924). Whether the dwarf rattlesnake plantain and ovate spike-sedge still occur in town is unconfirmed.

In 2012, NHESP identified four BioMap2 Core Habitats[31] falling entirely or partially within Shutesbury. Such habitats are considered to be the most important areas for long-term viability of terrestrial and wetland elements of biodiversity in Massachusetts. They contain rare plant and animal populations, constitute exemplary natural communities, and provide habitat for the maximum number of terrestrial and wetland plant and animal species and communities. NHESP considers the contained community types as ecologically important areas worthy of long-term protection. Core Habitat areas cover 3,993 acres (23 percent of town), including much of Brushy Mountain, land around Lake Wyola, the Quabbin Reservoir and Reservation, and South Brook and Footit Swamp. Although important plant communities in BioMap2 Core habitat are not subject to protection under MESA or any other Massachusetts statutes or regulations, their presence can be used to identify ecologically important areas that are worthy of protection.

Critical Natural Landscapes (CNL) are areas surrounding Core Habitats that provide buffers for Core Habitats, connectivity between Core Habitats, sufficient space for ecosystems to function, and contiguous undeveloped habitats. CNL cover 13,904 acres, or 80 percent of the town's land

[31] https://www.mass.gov/service-details/biomap2-conserving-the-biodiversity-of-massachusetts-in-a-changing-world

Boardwalk through Bog at **Julian's Bower** (Susan Loring-Wells)

G. FISHERIES & WILDLIFE

G.1 Wildlife Habitat

The heavily forested landscape of Shutesbury provides abundant wildlife habitat for a diversity of species, including some state-listed rare species. Several sources of information were used to compile a wildlife inventory of Shutesbury (see *Appendix A*).

As opposed to some bird species, none of the mammals inhabiting Shutesbury are migratory, and their home ranges correlate with mobility, denning characteristics, food requirements, and the need for connectivity between diverse habitat types. Small mammals tend to only use small home ranges, whereas large mammals can have home ranges of several thousand to tens of thousands of acres. Because of the large blocks of continuous forest in and around Shutesbury, several mammals listed as using greater than 20,000 acres for their habitat have been seen often in town: black bear, fisher, bobcat, and moose. Dozens of birds are year-round residents. Many birds found in Shutesbury are migratory, however, and only present during the breeding season or for short foraging stay-overs during migration. Some amphibians require vernal pools (i.e., temporary pools

present during the spring breeding season that are devoid of fish), others use permanent water bodies to breed and spend the rest of their time in the woods, and others spend most of their adult and juvenile lives in wetlands. The surface waters of Shutesbury are home to a number of native trout, bass, smaller fish, and Atlantic salmon (restricted to Quabbin and adjacent portions of the West Branch of the Swift River), many of which are species of concern. Numerous invertebrates exist in Shutesbury, including various species of butterflies, moths, bees and wasps, dragonflies and damselflies, beetles, spiders, mollusks, crustaceans and worms. Both terrestrial and aquatic invertebrates serve as food sources for numerous mammals, fish, birds, reptiles and amphibians, whereas others serve to pollinate flowering plants.

The impressive diversity of wildlife in Shutesbury is due in large part to the diversity of wildlife habitats that exist. Wildlife populations use habitat areas for food and water supplies, for shelter, mating, and raising of young. Many species rely on a variety of habitats during different periods within their life cycles, and species diversity is often greatest in edge areas — areas in which several different habitat types meet — such as fields next to forests or forests next to wetlands. When evaluating land protection needs in Shutesbury it is important to note that some of the larger mammals have home ranges spanning several thousand or tens of thousands of acres of forest or mixed habitats, which may include areas in adjacent towns in addition to Shutesbury. Therefore, land protection efforts should focus on protecting larger contiguous acreages of land that contain several habitat types or important wildlife corridors, rather than on small, isolated parcels of land, unless the latter contain important rare species habitat.

G.2 Rare and Threatened Wildlife Species

MassAudubon has designated both the Quabbin Reservoir watershed and the Brushy Mountain forest block as continental-level Important Bird Areas (IBA). An IBA "is a site that provides essential habitat to one or more species of breeding, wintering, or migrating birds and supports high-priority species, large concentrations of birds, exceptional bird habitat, and/or has substantial research or educational value."[32] Four state-listed bird species breed in the Quabbin IBA: the common loon, the American bittern, the bald eagle, and the pied-billed grebe. In addition, the large tracts of contiguous forest in the watershed support significant breeding populations of songbirds, including 35 high-conservation-priority species.

NHESP-designated Priority and Estimated Habitats are considered important to the growth and survival of rare wildlife species in that they provide food, shelter, or living space for breeding, resting, migration, or winter habitation. NHESP has confirmed the presence of seven threatened (T) or special concern (SC) wildlife species in Shutesbury: the marbled salamander (*Ambystoma opacum*) (T), the wood turtle (*Glyptemys insculpta*) (SC), the eastern box turtle (*Terrapene carolina*) (SC), the water shrew (*Sorex palustris*) (SC), the little brown bat (*Myotis lucifugus*) (SC), and the ski-tailed emerald dragonfly (Somatochlora elongata) (SC).

[32] Massachusetts Audubon Society. "Massachusetts Important Bird Areas (IBA)": https://www.massaudubon.org/our-conservation-work/wildlife-research-conservation/statewide-bird-monitoring/massachusetts-important-bird-areas-iba/

G.3 Wildlife and Recreation Opportunities in Shutesbury

In 2019 and 2020, the Quabbin Controlled Deer Hunt on Quabbin Reservoir Reservation lands was restricted to select towns and entry by foot; Shutesbury was not one of those towns. Hunting in the Shutesbury portion of the Quabbin Reservation will presumably occur again in the future, possibly on a rotating schedule. DCR also owns 4,147 acres of Off-Reservation Lands west and north of Route 202 where hunting is allowed for pheasant, ruffed grouse, quail, woodcock, turkey, various ducks, Canada geese, cottontail rabbit, black bear, coyote, white-tailed deer, gray squirrel, red fox, gray fox, opossum, raccoon, and snowshoe hare. Hunting seasons vary on a yearly basis but generally take place in fall and late winter or early spring. No hunting is allowed in Shutesbury State Forest, but in-season hunting is allowed on all private lands that are not otherwise posted. Trapping is allowed on Off-Reservation Lands, in the Shutesbury State Forest, and on non-posted private lands. Hunting and trapping activities come under the jurisdiction of the Division of Fisheries and Wildlife (MassWildlife).

The large expanses of undeveloped area in Shutesbury, especially those traversed by trail systems, support additional recreational opportunities such as hiking, tracking, nature-watching, cross-country skiing, snowshoeing, mountain biking, and snowmobiling on lands not posted or otherwise restricted by statute. Hiking, nature study, and snow-shoeing are allowed on Quabbin Reservation Lands, whereas ATV riding, mountain biking, camping, horseback riding, snowmobiling and cross country skiing are prohibited. Off-Reservation Lands have the same allowed and prohibited uses, except that cross-country skiing is allowed.

H. SCENIC RESOURCES AND UNIQUE ENVIRONMENTS

H.1 Scenic Areas and Vistas

Because of the heavily forested landscape, few of Shutesbury's scenic areas consist of distant vistas anymore. However, certain locations in town where a power-line cut or clearing exist provide lovely views of Mt. Wachusett, Mt. Monadnock, Mt. Greylock, or the Holyoke Range. There is also an incredible scenic vista along the fields at Banfield Farm in the southern part of town. The 1982 Massachusetts Heritage Landscape Inventory selected Quabbin Reservoir and adjacent lands as a scenic landscape, based on their wilderness qualities, dramatic views of forested hills and extensive waterscape. One such view appears on the Shutesbury Town seal. The tree-canopied "S-curves" of Leverett Road, which wind along Roaring Brook, "the cascades" on Dean Brook, and the highpoint off Carver Road are often mentioned as especially scenic spots in town. In addition, Lake Wyola, Atkins Reservoir, Ames Pond and Footit's Bog Dudleyville Marsh (formerly Dudleyville Ponds or Brown's Pond), bogs on Montague and Pelham Hill Roads, the "High Bridge" waterfall, the Monks/Beehive Caves, Adam's Tomb, the Town Farm, the Town Pound, and other old structures are often mentioned by residents as favorite scenic spots (see *Scenic Resources and Unique Environments Map* at the end of this section).

H.2 Trails

There are many pleasant trails through town, including the regional Robert Frost and New England (formerly M&M) Trails, the wood roads and trails of the Quabbin Reservoir watershed, many private dirt roads, and several power line easements under active vegetation management. All these trails offer passage through beautiful forests and past clear running streams, old stone walls, cellar holes, and foundations. Mapped local trails include the Fiske Pond Trail at Lake Wyola and Houston Gage Trail off Sand Hill Road. The paved and gravel roads in Shutesbury are regularly used by local walkers, runners, and bicyclists, and the S-curves are often used as a scenic (and challenging) bike route by bicyclists from other towns.

In March 2009, the M&M Trail was named the New England National Scenic Trail and designated as a National Park Service National Scenic Trail. It extends from Connecticut to New Hampshire. Coincident with the designation, a large part of the M&M Trail on private land in Shutesbury was relocated to areas crossing mostly state land. Sections 12-14 of the trail cross the eastern side of Shutesbury, totaling approximately 14 miles. The trail travels over logging roads and gravel roads on gentle slopes, crossing Atherton Brook at the southern end and passing through Lake Wyola State Forest at the northern end.

H.3 Historic Features and Sites

Scenic landscapes, old roads, and historical sites contribute to the rural scenic resources and unique environments in Shutesbury (see *Scenic Resources and Unique Environments Map* at the end of this section). A 1998 Metropolitan District Commission site survey identified 31 historical archeological sites on the Quabbin Watershed Reservation Land that lies in Shutesbury. Artifacts have been identified that suggest the Swift River Valley was occupied by Native Americans starting between 9,500 and 12,000 years ago.

Elements of the town's colonial settlement period appear in the distinctive 19th-century character of the town's narrow lanes, stone walls, six old cemeteries, and several old farmhouses. When residents were forced to move from portions of Shutesbury's most fertile farmland along the West Branch of the Swift River to allow construction of Quabbin Reservoir in the late 1930s, old wood roads, stone walls, foundations of farmsteads and mills, horticultural plantings, and wells and cisterns were left behind that are still visible in Quabbin forestlands today.

Historical buildings have preserved historical architectural elements. The Shutesbury Town Common is an attractive, open, grassy area at the top of the hill in the center of town where the town's three major roads (Wendell, Cooleyville, and Leverett) converge. The Town Common is surrounded by several attractive old buildings, including the community church, built in 1827. This is a typical New England church with a white wooden exterior and a tall spire. The church has undergone important repairs, especially to the tower and spire, although there are uncertainties regarding its ownership and future. The attractive "cottage style" one-room library was built in 1902 and partially renovated in 2007 to provide Americans with Disabilities Act (ADA) compliant access. Town Hall Annex (the original 1829 Town Hall) is an attractive Greek Revival building that was recently restored. Today's Town Hall was built in 1950 as the first centrally located school in town and sits across Cooleyville Road from the Common. The Common also contains a small four-sided wooden structure that dates back to 1837 and serves as a guidepost containing directions

and distances from Shutesbury to many places, including Boston, Worcester, Northampton, Erving, Warwick, New Salem, Keene (New Hampshire) and Prescott (no longer existing, since it was flooded during the construction of the Quabbin Reservoir in the 1930s). Elsewhere in town, two of the ten original one-room schoolhouses built before 1871 still stand in their original locations on West Pelham and Schoolhouse Roads. The Bennett House at Lake Wyola Park, dating from 1768, and subsequently modified and renovated many times, served for many years as an inn. The house is associated with a beautiful, two-story barn built between 1870 and 1880 that contains a suspended, wooden dance floor. Both structures are now owned by the Commonwealth and DCR has committed to preserving them, although it has no specific plans or funding for doing so.

There are several other interesting and unusual sites in town that could be protected for archeological and historical reasons. The most popular are probably the Ames Hill (Levenger property), Mount Mineral (Temenos property), and the Freeman Road "beehive caves" or "monks caves," a series of oval, beehive-shaped underground "rooms" constructed with hand-placed rocks. These structures contain a small opening at ground level. Similar structures have been found in Leverett, Pelham, Wendell, Belchertown and Leyden, as well as in parts of Vermont and New Hampshire. The origin and functions of these structures are unknown and have been the subject of dispute by the several historians and archeologists who have studied them, but various theories have attributed their construction to Native Americans, ancient Irish monks (circa 1,000 A.D.), or early settlers. There are also unique stone cliff carvings of a more contemporary nature on Mount Mineral, as well as some remnants of the 19th-century Mount Mineral Springs Hotel that served guests seeking the healing waters of the mineral springs (iron, sulfur, and manganese) located there. The Old Town Pound on the southern side of Cooleyville Road, 0.4 miles east of the center of town, is another landmark worthy of protection. This structure is a 50 foot by 40 foot, rugged, stone-walled enclosure built in 1806 by early residents to hold stray livestock. The enclosure was originally 72 inches high, but now stands only 30 inches high in some places. There are also a few old cemeteries in town containing gravestones dating back to the 1800s and ranging in condition from good to poor.

Other intriguing stone structures are located in the woods in different parts of town. Some very nice stone foundations of early houses and barns can also be found along most roads in town, as well as back in the adjacent woods. Such structural remains give an indication of the locations of past clearings and farm sites. One such site is the Town Farm south of the Town Hall. Throughout town, well-preserved, beautiful stone walls also give further insight into Shutesbury's agricultural past. Land owned by the Sirius Community east of Baker Reservoir contains a series of hearthstone-shaped stone structures of unknown origin and function, suspected to have been created by Native Americans. The Shutesbury Historical Commission is committed to ongoing work to protect suspected Indigenous Ceremonial Stone Landscapes.[33]

Because forestry was an important industry during the last century, the remains of a number of late 19th/early 20th century sawmills can be observed at a number of sites: the Thompson Camp and Ober Sawmills (on Roaring Brook near the "high bridge"), the Ames Sawmill (at Ames Pond), the

[33] Shutesbury Historical Commission, *Introduction to Indigenous Cultural Sites in Shutesbury, Massachusetts* (2021): https://www.shutesbury.org/sites/default/files/offices_committees/historical/Introduction%20to%20Indigenous%20Cultural%20Sites%20in%20Shutesbury_0.pdf

Dudley Sawmill (at the Dudleyville Marsh), the Adams-Fitts Sawmill (that operated for 150 years on the Banfield property), and the Albert Baker Sawmill on Dean Brook west of West Pelham Road and south of Baker Road. The remains of this latter sawmill are located on private land and include a well-preserved dam, a mill foundation, a tailrace tunnel, and a small stone bridge. West of Baconville and south of Sand Hill Road, a second Albert Baker Sawmill was built. Today, the remains of an earthen dam, a concrete dam, and a diversion channel can be seen at the site. The site of a former wooden rake and scythe factory (Crossman's Mill and Rake Factory) is located nearby on Dean Brook. There are several more mill sites east of Cooleyville Road, including the Frost Mill, which still retains parts of the mill apparatus. More mill and dam stone works are located in the northeastern corner of town, including a number of stone "columns."

H.4 Unique Natural and Geologic Features

Important natural sites that should be protected are the Dean Brook cascades, "the boiling springs," Footit's floating sphagnum bog, the Montague Road bog, the old bog on Pelham Hill Road, the "High Bridge" waterfall, and Meetinghouse Hill, the highest point in town.

The Dean Brook cascades are probably the most outstanding natural feature in Shutesbury. They are located off Sand Hill Road on a portion of Dean Brook that drops 55 feet in elevation over a distance of 400 feet, creating a series of small waterfalls in a miniature gorge, and ending in a large pool. At the base of the waterfalls is a 35-foot diameter pool that is 4 feet deep. Hemlock, yellow and white birch, mountain laurel, and witch hazel grow on the slopes surrounding the waterfalls. Due to the steep slopes and shallow-depth-to-bedrock soils, this location is a beautiful, but fragile, site. Although this area is located on protected Town of Amherst watershed land, it is susceptible to overuse by the public and is now posted for no trespassing as Amherst Watershed Land.

The boiling springs are found on private property in The Plains section of town in a stand of hemlocks located west of Montague Road. The springs consist of three distinct areas where water bubbles to the surface, including a large spring with a diameter of 10 feet. Other smaller springs are located 200 yards to the north. The purple fringed orchis (a member of the orchid family) and watercress have been observed at the springs.

Footit's Bog, located off a trail from Freeman Road, is approximately 2 acres in size and a fine example of a floating sphagnum bog. Footit's Bog contains a variety of wetland plants: pitcher plants, water lilies, swamp loosestrife, bog laurel, leatherleaf, wild cranberry, witherod, speckled alder, highbush blueberry, red maple, and black spruce. Because of its relatively obscure location on private land, it has so far remained protected from alteration. The bog was given added and more permanent protection when a conservation restriction was placed on the land in which it is contained.

Another nice example of a true bog, with sundews, cotton grass, and pitcher plants, is located off Montague Road on the western side of the Dudleyville Marsh. This bog will change over time due to the drastic decrease in water level resulting from the state-mandated retirement of the old private dam.

An old bog in its final stages of succession is located west of Pelham Hill Road and north of Leonard Road. It is 8 acres in size and contains no open water because the accumulation of organic

matter has completely filled it in. The area is covered in sphagnum moss and contains silky dogwood, speckled alder, arrowwood, red maple, gray birch, ash, and American elm.

The "High Bridge" waterfall is located on Roaring Brook approximately 0.5 miles east of the Shutesbury-Leverett line. The waterfall begins at a point just below the remains of one of the former sawmills and is followed by a cascade-type waterfall that extends for approximately 250 feet downstream.

At an elevation of 1,305 feet, Meetinghouse Hill is the highest site in town. It is located off Wendell Road approximately two miles north of the present Town Hall.

Ames Pond is a 22-acre pond with a 25-acre adjoining wetland and bog, recently acquired by Kestrel Land Trust and now open to the public. Five miles of trails lead to a dramatic cliffside overlook. The conservation area is dotted with the sculptures and poetry of the former owner, Julian Janowitz, who bequeathed the land.

I. ENVIRONMENTAL CHALLENGES

I.1 Development and Land Conversion

Environmental problems caused by land conversion and the removal of trees and other vegetation include increased erosion, siltation, and stormwater runoff. Development brings an increase in nonpermeable land surface, reducing the natural ability of healthy soil and vegetation to absorb and filter surface runoff. High-density development in Shutesbury could threaten water quality because it situates septic wastewater disposal in proximity to drinking water wells. Different kinds of development also put varying levels of strain on municipal services, such as the school, fire protection, police services, and the highway department, thereby creating additional financial burdens for the Town (see *Section 3.D.3.2 Cost of Community Services).*

Intact forests contribute a wealth of benefits to the community, including scenic character, wildlife habitat, clean air and water, carbon sequestration, numerous outdoor recreation opportunities, wood products, etc. Shutesbury is able to control for dense development by applying several state and local regulations, including the Watershed Management Act Regulations, Title 5 Regulations, WPA Regulations, and the Town's Zoning Bylaw. The low and variable yields of the bedrock aquifer for drinking water and the large percentage of temporarily or permanently protected land further restrict development in town.

Land conversion is not always a result of building and parking lot development, however. In Shutesbury, large-scale ground-mounted solar development has converted acres of forest to fenced meadow. As of 2021, there are proposals on the table to further convert up to 180 acres of forested land on parcels privately owned by W.D. Cowls. As of the writing of this OSRP, the Town was evaluating the potential environmental and financial costs and benefits of such a project.

I.2 Landfills

There are no active or closed landfills in Shutesbury.

I.3 Hazardous Materials and Nonpoint Source Pollution

According to the Commonwealth's Waste Site and Reportable Releases Database, nine hazardous materials releases were reported in town between 1994 and 2008.[34] Four of these were residential fuel oil releases from underground or above ground storage tanks, one a gasoline release from an underground storage tank at the Town Highway Department facility, one a roadway vehicle spill of diesel fuel, two utility-related releases involving transformer oil, and one a release of hydraulic oil at one of the gates to Quabbin. All of these releases have been remediated.

In May 2008, during the reconstruction of Leverett Road, an additional release of gasoline from an abandoned 750-gallon underground storage tank was discovered at the Fire Station. In August 2010, over 3,000 tons of contaminated soil were removed from areas around the fire station and under Leverett Road. The Licensed Site Professional hired by the Town proposed using in-situ chemical oxidation. That procedure was approved by MassDEP in May 2012 and undertaken in the summer 2012. Early rounds of groundwater monitoring results indicated that drinking water wells were not being adversely impacted, and data gathered from monitoring wells indicated that the process had its desired effect on the contamination. The injected chemicals are expected to provide long-term biological oxidation of the hydrocarbon contaminants. In 2020, up to 15 gallons of hydraulic oil spilled from a trash truck in South Shutesbury within 500 feet of surface water and/or a wetland and within a public drinking water supply. The site is in the process of remediation.

Since Shutesbury has no landfills or industries, future releases are most likely to come from transportation accidents or residential fuel oil. The junkyard located off Pratt Corner Road, however, is a potential source for release of oil and hazardous materials to groundwater and nearby surface water streams, and that site may merit closer examination by the Town.

Sources of nonpoint source pollution in residential districts include the use of road salt and pesticides. Road salt has caused the contamination of numerous wells along Leverett Road. Since many lots contain small cleared areas that are fairly shady and, thus, not conducive to growing lush lawns or bountiful vegetable or perennial gardens, it appears that fertilizers and pesticides are used sparingly by local residents relative to surrounding more urban areas. Although potential impacts to soils, groundwater, and surface water cannot be confirmed without collection and analysis of samples, or by surveying residents about their lawn and gardening practices, it would appear that Shutesbury's groundwater and surface water is at low risk of a buildup of nutrients and potentially harmful chemicals from pesticides.

Membership in the Pioneer Valley Mosquito Control District was approved at the 2020 Annual Town Meeting. The Control District's work currently involves testing (not spraying) for mosquito-borne illnesses, but should the District decide to spray, this would introduce a new source of pesticide impacts, particularly on pollinators.

I.4 Flooding

As discussed in Section C above, major chronic flooding has not been a problem in Shutesbury nor would it be expected to be. Participants in the 2020 workshop for the MVP plan noted that

[34] https://eeaonline.eea.state.ma.us/portal#!/search/wastesite

heavy precipitation causes various minor flooding, with roadway flooding occurring town-wide. Participants highlighted Baker Road, Pratt Corner Road, Sandhill Road, Montague Road in several locations, Cooleyville Road, and roads along Lake Wyola as especially prone to flooding. Stormwater runoff on gravel roads causes roadside pooling that can cause residential basement flooding and weaken trees by flooding root systems.

According to the Shutesbury MVP workshop summary findings, the Lake Wyola Dam is classified as "high hazard" and failure of the dam would cause extensive damage to downstream infrastructure, residences, and roads. The Town employs a dam keeper to maintain the dam, which is slated for improvements based on a 2016 inspection (see *Appendix A* for more details). The failure of the McAvoy Pond Dam upstream of Lake Wyola in Wendell would activate the Lake Wyola Emergency Plan.

I.5 Erosion and Siltation

Erosion and siltation cause destruction of aquatic habitat in lakes, ponds, and vernal pools, and affect spawning habitat in streams. Heavy precipitation events can cause direct siltation of streams from overland runoff, as well as erosion of stream channels and road infrastructure. These events can cause gravel to migrate with runoff into culverts, affecting their water-carrying capacity and possibly lead to streambank erosion. Loss of streambank removes overhanging vegetation that serves as fish cover, raises the water temperature, and decreases oxygen levels. This can in turn result in changes to the species composition of streams, most notably the loss of coldwater fisheries. The Highway Department monitors culverts and replaces them as needed and some culverts have been enlarged/updated to meet the Massachusetts Stream Crossing Standards. But Shutesbury's culverts and bridges were designed to accommodate historic precipitation and runoff, and as precipitation events increase in intensity with climate change, undersized culverts are more likely to fail and contribute to flooding, erosion, and damage to infrastructure where streambanks are undercut. The conversion of homes around Lake Wyola from seasonal to year-round dwellings, which has increased impermeable surface, further contributes to these erosion and siltation processes in the Lake Wyola neighborhood.

A number of measures can be taken to reduce erosion caused by high-intensity storm events. The rigorous use of adequate erosion controls and efforts to rapidly stabilize areas of bare soils with permanent vegetative cover will help to control erosion. Preventing structures from encroaching in the floodplain and river corridor will allow natural stream processes and preserve the storage capacity of the floodplain. Furthermore, careful construction of drainage systems for new roads, as well as adequate and frequent maintenance of road surfaces and drainage systems will help to minimize the potential adverse impacts of stormwater runoff. Lastly, bioretention systems[35] that slow and sink runoff can be installed wherever they are needed and go a long way toward preventing flooding, erosion, and siltation. Fortunately, more recent population growth trends for Shutesbury indicate that, at least for the short-term, development pressure and associated environmental problems will be minimal. However, due to the erodability of the soils on steep slopes, the large number of dirt roads in town that need frequent maintenance, and the presence of ongoing logging operations, keeping erosion and siltation in check is an ongoing and necessary activity that is independent of development in town.

[35] Bioretention basins are landscaped depressions or shallow basins used to slow and treat on-site stormwater runoff.

I.6 Water Supply and Quality

Shutesbury does not have the thick stratified drift deposits and substantial recharge areas that are found in towns located on the floor of the Connecticut River Valley, nor does it lie in a flat area near a major river where it would be feasible to construct a traditional community wastewater treatment system. Although small community septic systems and public water supply wells serving a small portion of the community may be feasible in some areas of town. Shutesbury will likely have to rely on individual or small community water supply wells in bedrock for its water supply and on individual septic systems to serve the wastewater treatment needs of its residents.

Well water supply has been a slight concern for residents over the years, and may increase as climate change increases the frequency of droughts. By contrast, heavy rain events can also negatively impact drinking water wells. It was noted by 2020 MVP workshop participants that runoff from gravel roads has also led to the sedimentation of private wells.

The 2020 MVP workshop participants also observed that the Town's water supply for fire suppression — for which the Town relies solely on surface water sources — has been impacted by the increasing frequency and duration of droughts. Some firefighting water supplies have become unusable from lack of rain, and excessive weed growth in the summer has impacted access.

To protect water quality, the Town must ensure that septic systems are designed and maintained in accordance with Title 5 Regulation, that disposal of pesticides, herbicides, and household hazardous waste in a septic system is discourage through public outreach and education., and that development in surrounding watershed areas is closely monitored.

I.7 Invasive Plants, Forest Pests and Diseases

Invasive plants constitute another potential environmental concern for Shutesbury. The Massachusetts Invasive Plant Advisory Group has developed a list of 69 plant species that it has classified as being either invasive, likely invasive, or potentially invasive.[36] The list includes a number of trees, shrubs, and herbaceous plants that were previously not considered to be invasive and are known either to grow in the wild or to have been used as landscaping plants; the Massachusetts Department of Agricultural Resources has placed importation bans and propagation bans on those species.

Invasive species typically have one or more adaptations that allow them to out-compete native species, e.g., extensive and resilient root systems, the ability to produce large numbers of stress-tolerant seeds that may remain viable for long periods of time, the ability to disperse over spatial gaps, and fast growth rates. Although it is prudent to be aware of the spread of any invasive species, particularly in newly cleared areas, wetland areas tend to be the most susceptible to takeover by invasive species. The best way to control potential impacts to wetlands is to monitor these areas for invasive growth (as is already being done in Lake Wyola) and conduct ongoing maintenance programs for periodic removal of invasive species. Although invasives are not currently a problem in the corridor along the Sawmill River in Shutesbury, they are a problem downstream in neighboring communities. Thus it may be only a matter of time before invasive plants migrate upstream. Plans for projects that propose to clear vegetation from riverbanks or alter or replicate

[36] https://www.massnrc.org/mipag/index.htm

bordering vegetated wetlands should contain provisions for rapidly reestablishing temporary vegetative cover, actively planting and seeding altered areas with native species, and monitoring and controlling invasive growth until native species can become reestablished.

Another growing environmental concern is the recent invasion in Northeast forests of insect pests and diseases, in the hemlock wooly adelgid, hemlock elongate scale, the European gypsy moth, the Asian longhorn beetle, the emerald ash borer, and beech bark disease. Other pests and diseases are migrating toward Shutesbury, such as sudden oak death disease. With the vast tracts of highly valued, forested land present in Shutesbury, outbreaks involving one or more of these could be devastating. With this concern in mind, it may be useful for the Town to make efforts to educate Town boards, large landowners who may not already be familiar with these pests, and recreational users of the forests to look for and report back on warning signs of potential outbreaks. If Shutesbury is interested in maintaining the character and integrity of its many forests for scenic value, biological diversity, and recreational activities, it is essential that pests that could cause widespread devastation be observed in time and managed, if not eradicated.

Detailed descriptions of invasives, pests, and diseases impacting Shutesbury are included as Appendix A.

I.8 Pollinator Insect and Habitat Decline

Natural plant communities rely on pollinators such as bees, wasps, moths, butterflies, and birds to produce genetic diversity in the plants they pollinate and are therefore critical to the biodiversity and resilience of whole ecosystems. In the 2017 *Massachusetts Pollinator Protection Plan*, the Massachusetts Department of Agricultural Resources identified the need to evaluate, sustain, and enhance pollinator populations in the state. Both managed agricultural pollinators and wild native pollinators have declined in numbers in recent decades and are experiencing significant challenges to their survival.[37] A major research project led by Dr. Robert Gegear out of UMass Boston is collecting and sharing important information about the role of native bees in pollination and the plants and trees that support them.[38]

The most common and prolific pollinators are bees, of which there are over three hundred species native to New England. Many native bee species are much more effective than honeybees at pollinating flowers on a bee-per-bee basis, so agricultural growing practices that support native bees also tend to be good for crop pollination, increasing yields, and farm profit.[39] The widespread use of insecticides on farms, at residences, and in municipal and commercial land management is one of the most significant risks to pollinators. The impact of pesticide use in Shutesbury on insects is unknown and pesticide use is regulated at the state, not town, level. However, the safest course of action is to avoid pesticides entirely.

Another major risk to pollinators is loss of habitat and connectivity between the resources needed to complete their lifecycle. A variety of strategies can be employed to bolster and expand pollinator

[37] http://www.mass.gov/files/documents/2017/06/zw/pollinator-plan.pdf
[38] Beecology.wpi.edu

[39] The Xerces Society, "Farming For Bees: Guidelines for Providing Native Bee Habitat on Farms," 2015: https://www.xerces.org/publications/guidelines/farming-for-bees

habitat and develop "pollinator pathways" that can have a measurable impact. The 2021 *Franklin County Regional Pollinator Action Plan* contains land use analysis, land management strategies, recommended zoning changes, conceptual designs for various land use types, planting design typologies by land use type, planting lists, and other resources for improving pollinator habitat.[40]

I.9 Environmental Equity

Environmental Justice (EJ) is based on the principle underlying the Commonwealth's Executive Order No. 552, that all residents "have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment." The policy defines environmental justice as "the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits" and states that "no group of people, because of race, ethnicity, class, gender, or handicap bears an unfair share of environmental pollution from industrial, commercial, state and municipal operations or have limited access to natural resources, including greenspace (open space) and water resources." EJ populations are "those segments of the population that the Executive Office of Energy and Environmental Affairs (EEA) has determined to be most at risk of being unaware of or unable to participate in environmental decision-making or to gain access to state environmental resources." Communities are defined as EJ if they are either low income, have a high minority population, and/or have a high rate of English language isolation. Based on the 2014-2018 ACS 5-Year Estimates, Shutesbury's population is predominantly white, with approximately 6 percent minority representation. With a very small minority population, low-income residents geographically distributed throughout town, and very few residents speaking English "less than very well," there are no EEA-designated Environmental Justice communities in Shutesbury. Given the low density of development and preponderance of open space resources, there are no areas that stand out as being underserved by a lack of open space or recreational amenities in Shutesbury. And as there are no industrial operations or commercial businesses in town, there are no populations proximate to industrial activity.

Shutesbury's public-access open space and recreational areas are located throughout town, making a number of them within walking distance of most town residents. Very few businesses in town provide necessities such as food or clothing, so most residents have access to a vehicle for travel outside of Shutesbury. This high rate of vehicle ownership also facilitates ready access to nearby public open space or recreation facilities that are not within walking distance. Therefore, although those who are not able to drive are at a disadvantage, Shutesbury generally meets the open space access requirement for environmental equity that would exist if environmental equity populations were present.

[40] https://frcog.org/franklin-county-regional-pollinator-plan/

SECTION 5

INVENTORY OF LANDS OF CONSERVATION AND RECREATION INTEREST

A. INTRODUCTION

The previous sections of this plan have identified areas within the town of Shutesbury that are significant for their cultural, scenic, or ecological values. This information is helpful for understanding the character of Shutesbury and for outlining issues that may be of particular interest in open space and recreation planning decisions. Lands of conservation interest are those parcels of land that are significant because they are already protected from development or are a priority for protection. This next section provides an inventory of existing undeveloped land or land developed for recreation purposes containing these significant values or that have value to the community, so they can be prioritized for protection, maintenance, and improved access.

Open space is generally defined as undeveloped land. In Shutesbury, open space includes large tracts of forested land, ridgelines, waterways and waterbodies, wetlands, agricultural fields and barns, meadows, and scrub. Shutesbury residents value undeveloped land because of what it provides: actively managed farm and forestland, wildlife habitat, important plant communities, protection and recharge of groundwater, public access to recreational lands and trail systems, structures and landscapes that represent the community's heritage, and scenic views. The abundance of publicly accessible forestland in Shutesbury is particularly unique. The appearance of Shutesbury, its "sense of place", and the condition of its natural resources will not remain untouched by development without active stewardship and thoughtful planning. Planning for the protection of Shutesbury's green infrastructure can enable the town to proactively manage growth, protect wildlife habitat, ensure the integrity of drinking water supplies, continue to provide residents and visitors with a variety of outdoor recreation opportunities, and provide for residents' livelihoods.

Many recreation areas allow for passive recreation. Some recreation areas are built up with recreation facilities. Open space and recreation facilities can be either publicly or privately owned, and can be publicly accessible or not publicly accessible.

This section identifies public and private open space or recreation parcels, current land use, and the degree of protection. Approximately 70 percent of Shutesbury's total 17,400 acres is undeveloped open space with some level of protection from development (see Table 5-1). Land protected in perpetuity represents nearly two-thirds (61.6 percent) of the town's total acreage. However, the community's long-term open space and climate resilience goals call for ongoing permanent protection of the town's most valued resources. Shutesbury's long-term recreation goals also necessitate that the Town continue to work for improved access to open space via trails

and recreation facilities for a variety of users, which could be satisfied by improvements to existing public-access parcels.

A.1 Permanent Protection

Land is considered permanently protected when it is under fee ownership by a conservation organization or subject to a legal restriction prohibiting certain acts and uses for the purpose of protecting conservation values present on the land in perpetuity. Permanently protected land enjoys the highest degree of protection from development. In Massachusetts, there are a number of ways in which land can be considered permanently protected from development:

- a conservation restriction is attached to the deed;
- land owned by a state conservation agency, a non-profit conservation organization, or a conservation land trust;
- water supply land owned by a municipality or water district containing language in the deed that references water supply protection or Article 97;
- state or Town-owned land designated and used as a public park; and
- Town-owned land managed and controlled by its Conservation Commission.

This "permanent protection" is conveyed by Article 97 of the Amendments to the Massachusetts State Constitution. The only way that land falling under Article 97 can be developed is if two-thirds of the state legislature were to vote to change the use of the land. Though this rarely occurs, the state legislature can vote to release this protection at the request of local communities so that conservation land can be used for schools, roads, economic development, or other public projects not related to resource protection.

Like non-farmland, farmland can become permanently protected from development when the landowner sells the development rights for a parcel to a land trust or state agency. The Massachusetts Department of Agricultural Resources (MDAR) purchases the development rights of farmland in Franklin County regularly through its Agricultural Preservation Restriction (APR) Program. The program offers to pay farmland owners the difference between the "fair market value" and the "agricultural value" of their farms in exchange for a permanent deed restriction that precludes any use of the property that will have a negative impact on its agricultural viability.[1] The APR program requires a local match that can come from any combination of three sources: the municipality, a non-governmental organization such as a land trust, or bargain sale offered by the landowner. The local match requirement is 20 percent. Since the Town's adoption of CPA in 2008, the Town has not used CPA funds to meet the local match requirement for an APR project.

[1] https://www.mass.gov/service-details/apr-program-objectives-benefits

A.2 Temporary Protection

Parcels enrolled in Massachusetts Chapter 61 Current Use Tax Programs—61 (forestry), 61A (agriculture) and 61B (open space/recreation)—are considered to be temporarily protected from development. These programs offer landowners reduced local property taxes in return for maintaining land in productive forestry, agricultural or recreational use, or in a wild condition for a period of time. These "chapter lands" provide many public benefits, from maintaining wildlife habitat and recreational open space to sustaining rural character and local forest and farm-based economic activity.

A benefit of the Chapter 61 programs is that they offer Town governments the opportunity to protect land. When a parcel that is currently enrolled in one of the Chapter 61 programs is proposed for conversion to a use that would make it ineligible for the program, the Town is guaranteed a 120-day waiting period during which it can exercise its Right-of-First-Refusal to purchase the property. After signing a Purchase and Sale Agreement, the municipality has ninety days to complete the purchase if it elects to buy the property (or assign the right).

Exercising the Right-of-First-Refusal is difficult, however, unless there is an active program in place to acquire land. Towns looking to act on their Right-of-First-Refusal benefit from having criteria by which they identify ahead of time priority protection lands. Important characteristics that could motivate the Town to consider acting on its right include the presence of prime farmland soils, pasture, wetlands, aquifer, rare or endangered species habitat, or the parcel's potential as link between two other segments of protected land or a trail network.

A Town is also likely to be more successful in taking advantage of the Right-of-First-Refusal opportunity when partnering with a land trust or DCR and MassWildlife. These organizations can often fundraise much more quickly than a Town and don't have to bring the decision to purchase the land to a Special Town Meeting. The Town can work on these relationships ahead of time so that it is able to assign its Right-of-First-Refusal to the land trust as soon as the Select Board receives a notice to withdraw from a Chapter 61 program.

Currently 7.9 percent of land in Shutesbury, or roughly 1,367 acres, is enrolled in one of the Chapter 61 programs and is considered to have temporary protection from development. Following are details on each program.[2]

A.2.1 Chapter 61 - Forestry

The forestry program is intended for landowners interested in long-term, active forest management. Enrollment of forestland under Ch. 61 is based on the landowner's commitment to improving the quality or quantity of timber on the land. Wildlife, aesthetics, and recreation can also be incorporated into property management goals with DCR's Forest Stewardship Program. Program requirements include 10 or more contiguous acres, a state-approved forest management plan developed by a licensed forester or landowner, and periodic forest management as

[2] More information can be found on the UMass Extension's MassWoods website: https://masswoods.org/landowner-programs/chapter-61-current-use-tax-programs

recommended by the forest management plan. Landowners must renew their Ch. 61 enrollment every ten years with the local assessor's office.

A.2.2 Chapter 61A - Agriculture

The agricultural program is intended for landowners engaged in agricultural or horticultural use. Enrollment is based on the land's ability to produce the agricultural or horticultural product being grown. There is a five-acre minimum to enroll land in Ch. 61A. Forestland may be enrolled in this program and qualification is based on the land's ability to grow timber. Assessments and program requirements for Ch. 61A forestland are the same as they are in the Ch. 61 program. Landowners must renew their Ch. 61A enrollment annually with the local assessor's office.

A.2.3 Chapter 61B – Open Space and Recreation

The open space and recreation program is intended for landowners interested in maintaining the land for public and private recreation purposes, or as open space in a substantially natural, wild, or open condition. Landowners must include at least five contiguous acres of land. Forest management under Ch. 61B is not mandated. However, landowners do have the option of managing their forests if they develop a state approved forest management plan. Landowners must renew their Ch. 61B enrollment annually with the local assessor's office.

Lands in Chapter 61A and 61 (forestry) are not required to provide public access. Chapter 61B lands in the "natural, wild, or open" category can post their land to exclude public access; however, "recreation" lands must be open to the public unless the landowner is an organization with paying members, such as a rod and gun club.

A.3 Limited Protection

Land considered to have limited protection includes any Town-owned open space not under the authority of the Conservation Commission that could be developed through a decision by the Select Board or by Town Meeting vote. Roughly one percent of land in Shutesbury, or 186 acres, is considered to be under limited protection.

A.4 Summary and Open Space Map

Summary Table 5-1 lists land as under permanent, temporary, or limited protection, and within those categories as private, non-profit, or public. These types of open space are also identified on the *Open Space Map* found at the end of this section. The inventory that follows in Sections B thru D lists parcels by ownership type (private, non-profit, or public), and then by level of protection.

The *Open Space Map* shows that there are potential linkages between existing permanently protected lands that could be made for ecological or recreational purposes. These potential linkages are likely to be owned by private citizens. Landowners interested in protecting land can work with the Town, state conservation agencies, land trusts, and other conservation-minded organizations

invested in protecting farmland and forest in the Connecticut River Valley and North Quabbin region.

Lake Wyola (Susan Loring-Wells)

Table 5-1: Summary of Protected Open Space in Shutesbury

Level of Protection	Acres	percent of Land in Shutesbury (17,400 acres)
Permanently Protected Land		
Publicly Owned		
Commonwealth of Massachusetts	6,272	36.0%
Town of Shutesbury Conservation Commission	150	0.9%
Town of Shutesbury Public Cemeteries	9	0.1%
Town of Amherst Conservation Commission	255	1.5%
Town of Amherst Water District	532	3.1%
Total Publicly Owned	***7,218***	***41.5%***
Privately Owned		
Conservation Restrictions (CR)	3,191	18.3%
Agricultural Preservation Restrictions (APR)	164	0.9%
Private Cemeteries	2	0.0%
Total Privately Owned	***3,357***	***19.3%***
Non-Profit Owned		
Conservation Organizations	135	0.8%
Total Non-Profit Owned	***135***	***0.8%***
TOTAL PERMANENTLY PROTECTED LAND	**10,710**	**61.6%**
Land Under Limited Protection		
Publicly Owned		
Town of Shutesbury	186	1.1%
Total Publicly Owned	***186***	***1.1%***
TOTAL LAND WITH LIMITED PROTECTION	**186**	**1.1%**
Temporarily Protected Land		
Privately Owned		
Chapter 61	1,172	6.7%
Chapter 61A	71	0.4%
Chapter 61B	125	0.7%
Total Privately Owned	***1,369***	***7.9%***
TOTAL TEMPORARILY PROTECTED LAND	**1,367**	**7.9%**
TOTAL OPEN SPACE WITH SOME LEVEL OF PROTECTION	**12,265**	**70.5%**

B. PRIVATE LANDS

Approximately 27 percent of the land in Shutesbury with some degree of protection is privately owned. More than half of the privately owned land is protected because a private landowner voluntarily placed a development restriction on their land (CR or APR). The remaining parcels are temporarily protected from development through the Massachusetts Ch. 61 programs. Many landowners have taken advantage of the Chapter 61 programs as is evidenced by the fact that there are 1,367 acres of open space in the 61, 61A and 61B Programs combined.

Public access to private land is not guaranteed and is subject to change. State conservation agencies often require some level of public access before paying for, or accepting, conservation restrictions. Privately owned land that is unprotected may or may not allow public access. There are programs that allow land trusts to purchase temporary or permanent public access easements for hunting, fishing, wildlife viewing, and hiking from willing landowners so that landowners can supplement their income from their land in exchange for providing a community recreation asset.

In the following tables, privately owned protected parcels are categorized first as agricultural land and forest then by level of protection from development. The ownership of the land, assessors' map and lot number, and acreage are provided.

B.1 Privately Owned Farmland

B.1.1 Privately Owned Permanently Protected Farmland

According to the Town Assessor's records, the only APR in town is on Poverty Mountain Farm, protecting 164 acres of agricultural land, or 0.9 percent of the town's total acreage. The APR, held by MDAR, protects the largest piece of agricultural land in town and the farm is part of an important large agricultural block at the corner of Shutesbury, Amherst and Pelham. Some of this same property also has a permanent conservation easement with DCR for a portion of the Metacomet-Monadnock trail that runs through the woodland.

The parcels in Table 5-2 are permanently protected from development and are currently used as agricultural land. The zoning of the parcels is Roadside Residential and Forest Conservation Districts.

Table 5-2: Privately Owned Farmland Permanently Protected from Development

Owner(s)	Map/Parcels	Total Protected Acres	Present Holder of Rights
POVERTY MOUNTAIN FARM	ZV-1	164	MDAR
Total		**164**	

Source: Town of Shutesbury Assessor's Department, 2021

B.1.2 Privately Owned Temporarily Protected Agricultural Land

There are approximately 71 acres of farmland in the Ch. 61A Program in Shutesbury. Chapter 61A parcels must be at least five contiguous acres, must be "actively devoted" to agricultural or horticultural uses, and must earn at least $500 in annual gross sales. These lands are integral to Shutesbury's economy and to the livelihoods of Shutesbury residents, and are valuable as a source of food, as scenery, and for how they create a sense of place for the community. Some of the parcels may be especially important because they contain unique values such as stream corridors, prime farmland soils, wetlands, and areas that have been identified as containing key wildlife habitats and plant communities.

All parcels in Table 5-3 are in the Ch. 61A Program and the degree of protection of these parcels is temporary. The owner does receive an annual tax break. The zoning of the parcels is Roadside Residential and Forest Conservation Districts.

Table 5-3: Agricultural Land with Temporary Protection from Development through Enrollment in the Chapter 61A Land Classification and Taxation Program

Owners	Map/Parcel	Total Parcel Acres
HAYES RAYMOND J	H-53	38.6
PUFFER, STEPHEN J.	F-131	6
W D COWLS INC	U-10	6.65
WEIZENBAUM SHARON	V-6	10.9
WELLS JUDITH & WILLIAM	T-22	9.27
Total		**71.42**

Source: Town of Shutesbury Tax Assessors' Records, 2021

B.2 Privately Owned Forestland

Forest landowners can impact the forest beyond their property lines through development and management choices. Large blocks of contiguous forest form the basis for sustaining biological diversity in forested regions. Contiguous forestland in Shutesbury both creates and helps to buffer areas of interior forest habitat that span the towns of Shutesbury, Pelham, Leverett, Wendell, and New Salem.

The following inventory includes privately owned forestland at different levels of protection from development. Forestland that is permanently protected through ownership in-fee or CRs preserves the valuable attributes of forestland in perpetuity. Forestland enrolled in the Ch. 61 and 61B Programs is under temporary protection.

B.2.1 Privately Owned Permanently Protected Forestland

Permanently protected forestland exists when landowners have donated or sold their development rights to a Town, a state conservation organization, or a land trust. The landowners retain the other rights of ownership and they continue to pay property taxes, though the taxes will be less due to the reduced value of their land.

In December 2011, a very large land protection deal was completed in Leverett and Shutesbury between the landowner, W. D. Cowls Inc., and the Kestrel Land Trust, Franklin Land Trust, and Massachusetts DFG. The project, protecting a 5.4 square mile area known as Brushy Mountain, is the largest CR on private land in the Commonwealth's history. The $8.8 million cost was funded through several large grants, including a $5 million federal Forest Legacy Grant. A total of 3,486 acres, of which 655 acres are in Shutesbury, are protected for biodiversity resource protection, with public access for passive recreation allowed along the many trails and old woods roads that cross the property. The land is forested, and sustainable forest management is still permitted. DFG is the holder of the CR. The forest has been named the Paul C. Jones Working Forest, in honor of the company's founding family leader. The CR guarantees public access for passive recreation, including hunting, fishing, hiking, skiing, and wildlife observation. No motorized vehicles, except snowmobiles and those used for forestry practices, are allowed. The trail network has three parking access areas in Shutesbury.

In 2020, W.D. Cowls Inc. permanently protected an additional 1,939 acres of non-contiguous forest parcels in south and southwest Shutesbury as the Walter C. Jones Working Forest. These conservation restrictions are also held by the DFG and were funded by Forest Legacy and Landscape Partnership grants. The conservation restriction was purchased for $3.25 million. The forest will continue to be sustainably managed by W.D. Cowls Inc. Access is granted here as well for passive outdoor recreation activities. More than 95 percent of the Walter C. Jones Working Forest is identified as Core Habitat or Critical Natural Landscape (CNL) in BioMap2.

There are approximately 3,191 forested acres in Shutesbury (see Table 5-4) that are privately owned and permanently protected from development by a conservation restriction, which constitutes 18 percent of the total land area of Shutesbury. In total, 2,594 acres of permanently protected land in Shutesbury is owned by W.D. Cowls Inc, or nearly 15 percent of town. The zoning of the parcels is Roadside Residential and Forest Conservation Districts.

Table 5-4: Privately Owned Forestland Permanently Protected from Development by a Conservation Restriction

Owners(s)	CR Name	Map/Parcel	Total Parcel Acres	Present Holder of Rights
Antonino, Joan & Dimare, Charles		W-15	11.02	Con Com
Antonino, Joan & Dimare, Charles		W-120	2.90	Con Com
Dale Wpr		ZK-8, 9, 36, 119	18	DCRW (Office of Watershed Management)
Footit, Jean		E-2	236.10	DCR
Lacy Jeffrey R And Lacy Elizabethann M	Baker Fields Cr	Q-20	6.66	Con Com/KLT
Lacy Jeffrey R And Lacy Elizabethann M	Baker Fields Cr	Q-75	2.64	Con Com/KLT
Kmauri, Michael J.		ZK-27, 28, 32	215.30	DCR

Owners(s)	CR Name	Map/Parcel	Total Parcel Acres	Present Holder of Rights
Mauri, Michael J.		I-2	1.16	Connecticut River Conservancy
Old Peach Orchard Homeowners Assn	Old Peach Orchard CR	D-32, 33, 78, 79, 98	27.70	Con Com
Puffer Janet M. And Puffer Stephen J		F-23	75.30	DFG
W D Cowls Inc	Paul C. Jones Working Forest	ZF-32	121.8	DFG
W D Cowls Inc	Paul C. Jones Working Forest	ZF-18	232.40	DFG
W D Cowls Inc	Paul C. Jones Working Forest	ZF-15	296.80	DFG
W D Cowls Inc	Paul C. Jones Working Forest	F-30	4.4	DFG
W D Cowls Inc	Walter C. Jones Working Forest	ZW-6	389.74	DFG
W D Cowls Inc	Walter C. Jones Working Forest	W-94	0.03	DFG
W D Cowls Inc	Walter C. Jones Working Forest	ZG-2	829	DFG
W D Cowls Inc	Walter C. Jones Working Forest	ZQ-6	212.68	DFG
W D Cowls Inc	Walter C. Jones Working Forest	Q-70	21.06	DFG
W D Cowls Inc	Walter C. Jones Working Forest	ZO-6	261.04	DFG
W D Cowls Inc	Walter C. Jones Working Forest	O-108	0.71	DFG
W D Cowls Inc	Walter C. Jones Working Forest	ZO-3	139.14	DFG
W D Cowls Inc	Walter C. Jones Working Forest	ZP-7	69.12	DFG
W D Cowls Inc	Walter C. Jones Working Forest	P-70	0.55	DFG
W D Cowls Inc	Walter C. Jones Working Forest	P-2	11.5	DFG
W D Cowls Inc	Walter C. Jones Working Forest	R-27	1.49	DFG
W D Cowls Inc	Walter C. Jones Working Forest	O-58	0.4	DFG
W D Cowls Inc	Walter C. Jones Working Forest	O-59	2.33	DFG
Total			**3,190.97**	

Source: Town of Shutesbury Tax Assessors' Records, 2021

B.2.2 Privately Owned Temporarily Protected Forestland

Parcels in Shutesbury enrolled in the Chapter 61 Forestry and Open Space and Recreation Programs are primarily forested lands temporarily protected from development. Chapter 61 applies to forested parcels of ten or more contiguous acres managed under a 10-year forest management plan. Chapter 61B lands are a minimum of five acres and are devoted to open space or recreation.

Table 5-5 lists parcels in the Ch. 61 forestland program, which total approximately 1,172 acres (6.7 percent of the total land area of Shutesbury). Owners do receive a property tax break. The zoning of the parcels is Roadside Residential and Forest Conservation Districts.

Table 5-5: Forestlands with Temporary Protection from Development through Enrollment in the Chapter 61 Forestland Classification and Taxation Program

Owner(s)	Map/Parcel	Total Parcel Acres
Afferica, Joan M	J-8	0.80
Brown, David B	D-20	68.32
Brown, David B & Brown, Lois C.	D-21	55.00
Brown, David B.	D-24	14.54
Brown, Lois And Brown David	D-15	69.09
Footit Jean	E-25	8.97
Gjeltema Realty Trust	P-13	80.10
Kenerson Laurey C	P-38	13.77
Krafchuk Elizabeth	D-14	65.10
Marglin Stephen	Q-51	14.05
Mauri Michael J And Mauri Sabine B	I-2	1.16
Mauri, Michael J.	K-123	5.00
Miller, H; Miller, G; Smith, N.	ZD-25	102.00
O'brien Stephen M & O'brien Karin	S-1	15.15
O'brien Stephen M & O'brien Karin	S-3	38.00
Pearson, Wendy	R-15	34.00
Smith Charles Kay	M-18	30.20
Smith Miranda K	M-80	13.03
Springer Albert E	O-84	1.46
Trapani Josef G	U-43	4.07
W D Cowls Inc	ZX-4	13.60
W D Cowls Inc	F-27	8.61
W D Cowls Inc	N-34	11.70
W D Cowls Inc	O-108	0.71
W D Cowls Inc	U-11	5.10
W D Cowls Inc	ZD-37	263.00
W D Cowls Inc	ZH-12	42.20
W D Cowls Inc	ZL-20	50.80
W D Cowls Inc	ZU-2	140.18
Weilerstein Philip J	ZR-7	2.68
TOTAL		**1171.68**

Source: Town of Shutesbury Tax Assessors' Records, 2021

All of the parcels in Table 5-6 are in the Ch. 61B Recreational Open Space Lands Classification and Taxation Program, totaling 124 acres, or 0.7 percent of the total land area of Shutesbury. Owners of Chapter 61B lands in the "natural, wild, or open" category can post their land to exclude public access; however, "recreation" lands must be open to public access unless the landowner is an organization with paying members. The zoning for these parcels is Roadside Residential and Forest Conservation Districts.

Table 5-6: Forestlands with Temporary Protection from Development through Enrollment in the Chapter 61B Recreational Open Space Lands Classification and Taxation Program

Owner(s)	Map/Parcel	Total Parcel Acres
Addelson Kathryn	ZF-50	4.68
Addelson, Richard U	F-78	0.90
Clark Thomas	G-22	1.07
Clark Thomas	G-21	1.04
Clark Thomas	G-20	1.25
Cook, Thomas J	H-50	33.40
Gage, Margaret R. Estate Of	T-8	12.61
Historical Enterprises, Llc.	D-35	20.80
Houston Thomas F	U-18	3.51
Houston Thomas F	U-45	2.09
Kohler Ralf R.	W-30	11.37
Lacy Jeffrey R And Lacy Elizabethann	Q-74	12.90
Larue, David J.	Q-68	7.27
Marglin Stephen	Q-73	3.00
Stone Randall	H-61	7.74
Total		**123.63**

Source: Town of Shutesbury Tax Assessors' Records, 2021

C. PUBLIC PARCELS

State conservation agencies, water districts, and the Town of Shutesbury own a significant portion of Shutesbury's land area. Much of this land is permanently protected from development, but some is considered to have only limited protection from development. In total, there are 7,404 acres of publicly owned land, 42.6 percent of the total land area of Shutesbury. Of the 7,404 acres of public land, 90 percent is considered protected in perpetuity because it is owned by the state, by municipalities as water districts for the purpose of water supply protection, or is a cemetery.

C.1 State-Owned Land

Two agencies manage lands in Shutesbury owned by the Commonwealth: the Department of Conservation and Recreation (DCR) and the Department of Fish and Game, Division of Fisheries and Wildlife (MassWildlife). DCR manages the Shutesbury State Forest, Quabbin Reservoir Watershed lands, and Lake Wyola State Park (the Great Pond portion of Lake Wyola). All areas are open to the public. The state park charges for parking and provides a beach, accessible fishing area, picnic areas and a walking trail. Hiking is allowed on Quabbin Reservoir Watershed lands, but not biking, skiing, swimming, fishing, or camping. The Department of Fish and Game's MassWildlife Division manages the Brushy Mountain Wildlife Management Area. MassWildlife lands are managed for multiple uses, but hunting and fishing enthusiasts are more likely to utilize these sites as they do not have as many established trails and facilities.

Table 5-7 lists permanently protected public parcels of land owned by the Commonwealth of Massachusetts. DCR and MassWildlife manage a total of 6,272 acres or 36 percent of the total land area of Shutesbury. The zoning of the parcels is Roadside Residential, Forest Conservation, and Lake Wyola Districts.

Table 5-7: State-owned Land Permanently Protected

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Condition	Public Access	Recreation Value
DFG	F-1	Leverett Rd	23.91	Brushy Mountain WMA	Excellent	Yes	High
DFG	F-3	Leverett Rd	.75	Brushy Mountain WMA	Excellent	Yes	High
DFG	F-105	Leverett Rd	3.19	Brushy Mountain WMA	Excellent	Yes	High
DFG	ZF-45	Montague Rd	49.45	Brushy Mountain WMA	Excellent	Yes	High
DCR	B-648	Lakeview Rd	0.06	Lake Wyola State Park	Good	Yes	High
DCR	B-803	Lake Wyola	57.50	Lake Wyola State Park	Good	Yes	High
DCR	C-11	Farrar Rd	2.83	Lake Wyola State Park	Good	Yes	High
DEM	C-5	94 Lakeview Rd	30.86	Lake Wyola State Park & Bennet House	Excellent (Bennet House is in Poor condition)	Yes/ No	High: beach, accessible fishing dock, picnic tables, grills, volleyball court, parking, parking hut, restrooms
DCR	C-9	Farrar Rd	7.69	Lake Wyola State Park	Good	Yes	High
DCR - DIV. WSP	J-1	Mount Mineral Rd	31.80	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	J-2	Mount Mineral Rd	29.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	J-4	Mountt Mineral Rd	29.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	J-5	Mount Mineral Rd	43.74	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	J-6	Mount Mineral Rd	43.58	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	J-7	Mount Mineral Rd	9.33	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-1	New Boston Rd	11.01	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-10	Mount Mineral Rd	51.12	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-12	Cooleyville Rd	16.34	Quabbin Reservoir Watershed	Excellent	Yes	Medium

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Condition	Public Access	Recreation Value
DCR - DIV. WSP	K-13	Mount Mineral Rd	29.68	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-14	Cooleyville Rd	72.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-15	Mount Mineral Rd	5.08	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-16	Mount Mineral Rd	53.21	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-2	New Boston Rd	19.83	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-21	Mount Mineral Rd	14.21	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-3	New Boston Rd	41.08	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-4	New Boston Rd	10.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-5	New Boston Rd	5.92	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-6	Mount Mineral Rd	3.87	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	K-7	New Boston Rd	4.85	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-1	Cooleyville Rd	21.15	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-10	Cooleyville Rd	23.39	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-11	Cooleyville Rd	60.65	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-12	Cooleyville Rd	18.90	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-13	Cooleyville Rd	18.70	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-14	Cooleyville Rd	8.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-23	Cooleyville Rd	6.10	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-24	Cooleyville Rd	151.09	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-25	Cooleyville Rd	95.26	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-26	Cooleyville Rd	70.40	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-27	Cooleyville Rd	60.94	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-4	Cooleyville Rd	23.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Condition	Public Access	Recreation Value
DCR - DIV. WSP	L-5	Cooleyville Rd	20.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-6	Cooleyville Rd	10.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-7	Cooleyville Rd	29.50	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	L-8	Cooleyville Rd	22.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	M-17	Cooleyville Rd	26.70	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	M-19	Cooleyville Rd	2.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	M-21	Cooleyville Rd	21.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	M-31	Cooleyville Rd	42.20	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	M-32	Cooleyville Rd	49.70	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	M-38	Cooleyville Rd	4.80	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-10	New Boston Rd	43.77	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-11	New Boston Rd	6.53	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-12	Cooleyville Rd	9.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-13	Cooleyville Rd	7.70	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-14	Cooleyville Rd	0.90	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-15	Macedonia Rd	11.58	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-18	Cooleyville Rd	97.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-19	Cooleyville Rd	7.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-20	Cooleyville Rd	25.80	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-21	Macedonia Rd	50.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-22	Macedonia Rd	14.90	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-25	Cooleyville Rd	45.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-26	New Boston Rd	25.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Condition	Public Access	Recreation Value
DCR - DIV. WSP	N-27	New Boston Rd	8.26	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-28	New Boston Rd	46.51	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-29	New Boston Rd	43.20	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-30	Macedonia Rd	86.73	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-31	Macedonia Rd	11.70	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-32	Macedonia Rd	16.54	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-33	Macedonia Rd	9.55	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-35	New Boston Rd	9.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-36	New Boston Rd	25.54	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-37	New Boston Rd	46.26	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-38	New Boston Rd	17.40	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-39	New Boston Rd	15.72	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-40	New Boston Rd	30.10	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-41	New Boston Rd	51.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-42	New Boston Rd	14.60	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-43	New Boston Rd	13.63	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-44	New Boston Rd	161.28	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-45	Cooleyville Rd	60.86	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-46	Cooleyville Rd	131.21	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-47	Cooleyville Rd	34.02	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-48	New Boston Rd	79.45	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-49	New Boston Rd	15.23	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-50	Cooleyville Rd	19.20	Quabbin Reservoir Watershed	Excellent	Yes	Medium

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Condition	Public Access	Recreation Value
DCR - DIV. WSP	N-52	Cooleyville Rd	22.87	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-53	Cooleyville Rd	20.02	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-54	Cooleyville Rd	32.13	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-56	Cooleyville Rd	16.83	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-57	Cooleyville Rd	4.51	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-58	Cooleyville Rd	22.61	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-6	Cooleyville Rd	0.10	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-63	Cooleyville Rd	35.08	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-64	Cooleyville Rd	60.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-7	Cooleyville Rd	0.20	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-74	New Boston Rd	0.26	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-75	Cooleyville Rd	1.24	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-8	Cooleyville Rd	5.10	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-88	Prescott Rd	2493.99	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	N-9	Cooleyville Rd	0.30	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR -DIV. WSP	P-3	Pelham Hill Rd	9.50	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR - DIV. WSP	P-6	Pelham Hill Rd	16.00	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR	P-89	Pelham Hill Rd	9.38	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR	P-90	Leonard Rd	4.84	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR	P-91	Leonard Rd	4.50	Quabbin Reservoir Watershed	Excellent	Yes	Medium
DCR	L-2	Cooleyville Rd	15.49	Shutesbury State Forest	Excellent	Yes	High
DCR	M-33	Cooleyville Rd	8.35	Shutesbury State Forest	Excellent	Yes	High
DCR	M-34	Cooleyville Rd	26.66	Shutesbury State Forest	Excellent	Yes	High

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Condition	Public Access	Recreation Value
DCR	M-35	Cooleyville Rd	28.70	Shutesbury State Forest	Excellent	Yes	High
DCR	M-36	Cooleyville Rd	26.12	Shutesbury State Forest	Excellent	Yes	High
DCR	M-37	Cooleyville Rd	25.82	Shutesbury State Forest	Excellent	Yes	High
DCR	M-41	Wendell Rd	10.17	Shutesbury State Forest	Excellent	Yes	High
DCR	N-23	Macedonia Rd	44.95	Shutesbury State Forest	Excellent	Yes	High
DEM (SF)	N-51	N. Macedonia Rd	25.16	Shutesbury State Forest	Excellent	Yes	High
DCR	N-55	Cooleyville Rd	0.61	Shutesbury State Forest	Excellent	Yes	High
DCR	N-61	Cooleyville Rd	49.98	Shutesbury State Forest	Excellent	Yes	High
DCR	N-62	Macedonia Rd	137.51	Shutesbury State Forest	Excellent	Yes	High
DCR	N-66	Cooleyville Rd	42.47	Shutesbury State Forest	Excellent	Yes	High
DCR	N-67	Cooleyville Rd	55.43	Shutesbury State Forest	Excellent	Yes	High
DCR	N-68	Cooleyville Rd	79.57	Shutesbury State Forest	Excellent	Yes	High
DCR	N-69	Macedonia Rd	151.77	Shutesbury State Forest	Excellent	Yes	High
Total			**6,272.36**				

Source: Town of Shutesbury Tax Assessors' Records, 2021

C.2 Land Owned by the Town of Shutesbury

The Town owns a total of 345 acres that can be considered open space, recreation, or historic resources. Many of these Town-owned parcels have buildings on them.

C.2.1 Permanently Protected Town-owned Land Managed by the Conservation Commission

Land held by the Conservation Commission (Con Com) is considered permanently protected because it would take a two-thirds vote of the Massachusetts State Legislature to convert the parcel to another non-conservation use. Many of these open spaces currently help protect wetlands and tributaries, provide public access to other large blocks of protected lands, and together help to extend the habitat and recreation value of the state lands. Permanently protected Town-owned open space totals 150 acres, or 0.9 percent of Shutesbury's total land area.

Most of the conservation properties are small, except for the ***Lake Wyola Conservation Area*** and ***South Brook Conservation Area***, which abuts it, located on the south side of the lake. Together, the Lake Wyola Conservation Area and South Brook comprise a 97-acre area of lake and shoreline, wooded swamp, upland woods with eskers, and a network of trails. The South Brook parcel was acquired to help protect the Lake Wyola watershed. The Lake Wyola Conservation Area, which once acted as a town beach, now contains a public boat launch and a small landscaped park with a gazebo named ***Elliott Park***. In 2014, the Library established a Canoe & Kayak Loan Program located at the former beach. The Lake Wyola Conservation Area has potential for parking. Parts of both conservation areas have potential for ADA accessible pathways.

There are two small conservation areas on the northern side of the lake. The 1.4-acre ***Garbiel Gift*** parcel off Cove Road is a nice picnic area on the water with a great view. The Top of the Lake Park and Wyola Island property off Merrill Drive was purchased by the Town to allow additional public access to the lake shoreline. ***Top of the Lake Park*** contains a simple stone kayak/canoe launch along the lake's edge. A fence installed on the east property line is planted with native shrubs. This area has potential for ADA parking and path access to the water.

The ***Montague Road Conservation Area*** includes part of a lovely bog and wooded wetland, with the upland area being mostly forested, with a mountain laurel understory. There are presently no trails or picnic areas on the parcel. The ***Mt. Mineral Road*** parcel is landlocked and its boundaries are not identified with iron pins or other markers, so it is difficult to find. ***Haskins Meadow***, which was a joint Self-Help project with Leverett and Amherst, is located between East Leverett Road in Amherst and January Hills Road in Shutesbury. With the addition of a gift of an adjacent wooded wetland, the Shutesbury portion is 31 acres. Much of this area is field and meadow, parts of which are transitioning into brush. There is a nice small stream flowing through the Shutesbury property. The Amherst Conservation Commission has an agreement with Shutesbury for mowing a path through the meadow for walkers.

Table 5-8: Town-Owned Land with Permanent Protection: Conservation Commission

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/Current Use	Public Access	Condition	Recreation Value/ Potential	Zoning *	Grants	Degree of Protection
Con Com	X-7, 34	January Hills Rd	31.1	Haskins Meadow/ Passive recreation and wildlife habitat	Yes, through Amherst	Good	Trail through meadow overgrown; potential to reestablish	FC	Self-Help Grant with Amherst and Leverett & gift	Permanent
Con Com	B-800	Randall Rd	47.8	Lake Wyola Conservation Area/ Passive Recreation	Yes	Fair-good	Trails, gazebo, boat ramp, fishing	RR & FC	Self-Help Grant	Permanent
Con Com	E-3	Locks Pond Rd	49.2	South Brook Conservation Area/ Passive recreation & wildlife habitat	Yes	Good	Trail network	RR & FC	Self-Help Grant	Permanent
Con Com	F-49	Montague Rd	3.1	Montague Road Conservation Area/ Wildlife habitat	Yes	Good	Could create short trail	RR	Tax title and TM vote 1992	Permanent
Con Com	J-3	Mount Mineral Road	1.7	Mount Mineral Road Lot/ Passive recreation & wildlife habitat	Yes	Good	Access to hiking on DCR land	FC	Tax title and TM vote 1992	Permanent
Con Com	B-805	Locks Pond Rd	14.8	Lake Wyola land under water and dam area/ Active & passive recreation & wildlife habitat	Yes	Good	Boating, fishing, swimming	LW	Self-Help Grant for dam area	Permanent
Con Com	ZB-293	Cove Rd	1.4	Garbiel Gift/ Passive recreation	Yes	Good	Picnic area, small boat launch	LW	Gift	Permanent
Con Com	ZB-679	Merrill Dr	0.6	Top of the Lake Park and Lake Wyola Island/ Passive recreation	Yes	Good	Picnic area, small boat launch	LW	Town purchase	Permanent
Total			**149.70**							

*Note: In the Zoning column, FC = Forest Conservation District, RR = Roadside Residential District, LW = Lake Wyola District, and TC = Town Center District.

Source: Town of Shutesbury Tax Assessors' Records, 2021

C.2.2. Permanently Protected Town-owned Cemeteries

Cemeteries are considered permanently protected. Shutesbury has three active cemetery parcels and one future cemetery parcel, totaling 9 acres. They are scattered throughout town.

Table 5-9: Town-Owned Land with Permanent Protection: Cemeteries

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Public Access	Condition	Grants	Degree of Protection
Select Board	D-10	Locks Pond Rd	0.80	Locks Hill Cemetery/ cemetery	Yes	Good	Town purchase	Permanent
Select Board	U-7	Pratt Corner Rd	0.30	Pratt Corner Cemetery	Yes	Good	Town purchase	Permanent
Select Board	P-29, 31-36	Leverett Rd	7.95	West Cemetery	Yes	Good	Town purchase	Permanent
Total			**9.05**					

Source: Town of Shutesbury Tax Assessors' Records, 2021

C.2.3 Town-owned Land with Limited Protection

All parcels under the authority of the Select Board or any other jurisdiction other than the Conservation Commission are subject to land conversion based on a Town Meeting vote and therefore are considered to have limited protection. While many of these properties are very small and do have any established trails or recreation amenities, some Town-owned parcels do have recreation value or potential. Town-owned land with limited protection constitutes 186 acres or one percent of the town's total land area (see Table 5-10). This includes the following important recreation or potential conservation sites.

Field behind the Fire Station (2 acres). This area is occasionally used for soccer, football, general play, baseball/softball, and also for town's July 4th bonfires. It has an old horse paddock in back that was formerly used by 4H club members for horse events. Four ground-mounted solar panels have been installed on the edge of the field, but are not in the way of other activities on the site.

Field behind Town Hall (3 acres). This area is used for general play and picnicking. A part of this area has been used for the installation of four ground-mounted solar panels, but most of the field remains open and is used occasionally for town events.

Woodland behind Town Hall (9 acres). This land connects to Quabbin watershed land on the southern side, and could provide a pleasant walking/cross-country skiing trail behind Town Hall. An advantage is that ample parking is already available.

Elementary School playing areas and woods (estimated at 9 acres). This area is available for baseball/softball, basketball, cross-country skiing, football, soccer, general play, nature observing, and walking/jogging. The school's outdoor amenities include swing sets and playground equipment (the only public playground in town), minimally improved fields used for school recess and sports, a running track, a paved parking area used for basketball, hopscotch and child bicycling, and woods that contain limited trails. Residents may use this site outside of school hours.

Table 5-10: Town-Owned Land with Limited Protection

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Public Access	Condition	Recreation Value	Conservation Interest	Zoning *	Grants Received	Degree of Protection
Select Board	A-49, 50, 51, 52, 53,54	South Laurel & Laurel Dr	5.98	Lake Wyola land underwater	Yes	Good	High	High: existing recreation area	LW	None	Limited
Select Board	B-153	Locks Pond Rd	0.12	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-167	Great Pines Dr	0.11	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-169	Great Pines Dr	0.11	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-190, 191	King Rd	0.18	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-199	King Rd	0.12	Road triangle	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-22	Oak Knoll	0.11	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-10, 27, 28	Great Pines Dr	0.30	Roadside parcel	Yes	Good	Low	High: woodland in high-density residential area near Lake Wyola; part of NHESP Estimated and Priority Habitat; adjacent to BioMap2 Core Habitat	LW	None	Limited
Select Board	B-524	Watson's Straights	0.12	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	RR	None	Limited
Select Board	B-547	Watson's Straights	0.07	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	RR	None	Limited
Select Board	B-641	Lakeview Rd	0.09	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	RR	None	Limited
Select Board	B-661	Merrill Dr	0.09	Roadside parcel	Yes	Good	Low	Medium: protection of Lake Wyola watershed	LW	None	Limited
Select Board	B-801, 805, 817	Locks Pond Road / Lake	41.73	Lake Wyola/ lake-edge	Yes	Good	High: existing	High	LW	None	Limited

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Public Access	Condition	Recreation Value	Conservation Interest	Zoning *	Grants Received	Degree of Protection
		Wyola Land Underwater		land and land underwater			recreation area				
Select Board	F-21, 22	Leverett Rd	31.40	Forested backlots	Yes	Good	Med: Good recreation area, poor access	High: BioMap2 Core Habitat; Interior Forest; adjacent to Cowls CR	FC	None	Limited
Select Board	F-48	Montague Rd	16.50	Forested lot	Yes	Good	High: Significantly increases adjacent conservation area for passive recreation use; old trails across property	High: Half of property is Biomap 2 Core habitat and remainder is CNL**; adjacent to Interior Forest; contain bog and wooded wetland	FC	None	Limited
Select Board	H-11	59 Leverett Rd	2.30	Town Highway Department	Yes	Good	N/A	N/A	RR	None	Limited
Select Board	H-23, 24, 64	12 Wendell Rd	0.09	Post Office	Yes	Good	N/A	N/A	RR	None	Limited
Select Board	H-3	Leverett Rd	0.01	Henry Tomb	Yes	Good	Low	High: historic value	RR	None	Limited
Select Board	K-53, 54, 55	Wendell Rd	3.60	Three adjacent lots off Wendell road	Yes	Good	Low	High: Adjacent to large block of CR-protected land; near BioMap2 CNL** to east and Core Habitat to west	RR/FC	None	Limited
Select Board	L-9	Cooleyville Rd	1.76	Forested backlot	Yes	Good	Medium	High: Surrounded by DCR State Forest and watershed land; includes BioMap2 Core	FC	None	Limited

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Public Access	Condition	Recreation Value	Conservation Interest	Zoning *	Grants Received	Degree of Protection
								Habitat and Interior Forest			
Select Board	M-1, 2, 4	Wendell Rd	0.34	Town Common	Yes	Good	Medium: Picnicking	Low	TC	None	Limited
Select Board	M-9	10 Cooleyville Rd	0.20	MN Spear Memorial Library	Yes	Poor	Low	Medium: Parcel could have trails and pollinator gardens	TC	None	Limited
Select Board	M-30	Wendell Rd	8.00	Forested backlot	Yes	Good	Low: Depends on whether there is an easement for access	High: Abuts DCR watershed land; within BioMap2 CNL** and Zone C of Quabbin water supply; near Interior Forest	FC	None	Limited
Select Board	N-65, 70	Off New Boston Rd	13.80	Forested backlot	Yes	Good	Low	High: abuts DCR watershed land; within Zone C of Quabbin water supply, BioMap2 CNL**, and near Interior Forest	FC	None	Limited
Select Board	O-32	66 Leverett Rd	21.20	Woodland on back part of Lewis Taylor homestead	Yes	Good	Med: Potential for trails, parking at library	High: In Zone C of Quabbin water supply, partially in Biomap2 CNL** and near Interior Forest	FC	None	Limited
Select Board	O-35, 36	42 Leverett Rd	0.90	Fire Station	Yes	Good	N/A	N/A	RR	None	Limited
Select Board	O-37, 38	Leverett Rd	2.80	Field behind Fire Station	Yes	Good	High: Soccer, football, softball	Low	FC	None	Limited
Select Board	O-44, 45, 46	Cooleyville Rd	3.24	Town Hall	Yes	Good	N/A	N/A	RR	None	Limited
Select Board	O-47	Cooleyville Rd	2.38	Field behind Town Hall	Yes	Good	High: general play, town	Low	FC	None	Limited

Manager	Map/ Parcel	Location	Total Parcel Acres	Site Name/ Current Use	Public Access	Condition	Recreation Value	Conservation Interest	Zoning *	Grants Received	Degree of Protection
							events, farmers market				
Select Board	O-55	Cooleyville Rd	0.10	Roadside parcel	Yes	Good	Low	Low	FC	None	Limited
Select Board	O-68	Pelham Hill Rd	2.59	Roadside parcel	Yes	Good	Low	Low	FC	None	Limited
Select Board	S-2	Off West Pelham Rd	0.30	Thin parcel no frontage	Yes	Good	Low	Low	RR	None	Limited
Select Board	T-44	West Pelham Rd	0.10	Corner parcel	Yes	Good	Low	Low	FC	None	Limited
Select Board	U-23	West Pelham Rd	0.13	Roadside parcel	Yes	Good	Low	Low	FC	None	Limited
Select Board	ZO-43	Leverett Rd	10.10	Forested backlot	Yes	Good	Low	Medium: abbuting Quabbin reservoir land	FC	None	Limited
Select Board	ZT-77	23 West Pelham Rd	15.05	Shutesbury Elementary School	Yes	Good	High: playgrounds; ballfields	Low	RR	None	Limited
Total			**186**								

*Note: In the Zoning column, FC = Forest Conservation District, RR = Roadside Residential District, LW = Lake Wyola District, and TC = Town Center District.

**Critical Natural Landscapes (CNL)

Source: Town of Shutesbury Tax Assessors' Records, 2021

All municipal park and conservation areas and programs in Shutesbury are evaluated for accessibility for people with disabilities as part of this plan. The results of this evaluation are included in *Appendix C: ADA Access Self-Evaluation*.

C.3 Land Owned by Town of Amherst

The Town of Amherst owns a total of 787 acres in Shutesbury that can be considered open space, recreation, or historic resources.

C.3.1 Permanently Protected Town-of-Amherst-owned Land

Shutesbury is one of a few communities in the state that has conservation land owned by another town within its borders. Table 5-11 shows that the Amherst Conservation Commission manages two permanently protected conservation areas with a total of 255 acres, or 1.5 percent of the town, both located in the Atkins Reservoir watershed. The Gage property off Sand Hill Road has a trail loop. The Houston property off West Pelham Road does not have an obvious access point or trail at this time.

Table 5-11: Permanently Protected Town of Amherst Land under Conservation Commission Control

Manager	Map/ Parcel	Location	Total Parcel Acres	Current Use/ Site Name	Condition	Public Access	Recreation Value	Zoning *	Grants Received	Degree of Protection
Town of Amherst Conservation Commission	ZU-9, 12	Sand Hill Rd	187.8	Bob & Peggy Gage Conservation Area/ passive recreation & wildlife habitat	Good	Yes	High	RR/FC	Self Help	Permanent
Town of Amherst Conservation Commission	ZU-13, 44	West Pelham Rd	67.4	Houston Conservation Areas/ passive recreation & wildlife habitat	Good	None Marked	High	RR/FC	Self Help	Permanent
Total			**255**							

*Note: In the Zoning column, FC = Forest Conservation District, RR = Roadside Residential District, LW = Lake Wyola District, and TC = Town Center District.

Source: Town of Shutesbury Tax Assessors' Records, 2021

C.3.2 Permanently Protected Town of Amherst Water District Land

The Amherst Water Department also manages land in Shutesbury for the Atkins Reservoir public water supply and adjoining watershed (Table 5-12). By law, a public water supply land is permanently protected under Article 97 if the deed explicitly states that it was conveyed to a Town for the purpose of public water supply or if it references Article 97. It was not within the scope of

this plan to research the deeds of each of the Town of Amherst water supply parcels in Shutesbury to determine their exact legal status; this plan assumes that the parcels are permanent. For Shutesbury to know for certain whether these parcels could ever come out of protection it is necessary to complete further deed research. This land is important for both the Towns of Shutesbury and Amherst for sustainable use of the reservoir.

The Amherst Water Department's policy is that the land and reservoir are not open to the public, although part of the Robert Frost Trail and a former section of the long distance M&M Trail pass through the watershed properties in this corner of Shutesbury. The reservoir area is well posted for no trespassing, as is some of the other watershed land.

Table 5-12: Water District-Owned Land with Limited Protection

Manager	Map/ Parcel	Location	Total Parcel Acres	Current Use/ Site Name	Condition	Public Access	Recreation Value	Zoning*
Amherst Water District	T-6	Atkins Reservoir	22.90	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	V-7	Cross Rd	5.60	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	V-8	Cross Rd	2.30	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	W-1	Cushman Rd	7.00	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	W-2	Cushman Rd	0.60	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	ZW-108	Sumner Mountain Rd	24.48	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	W-9	Cushman Rd	14.10	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	W-10	Cushman Rd	27.50	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	S-36	Baker Rd	15.79	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	U-6	Pratt Corner Rd	113.80	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	U-8	Pratt Corner Rd	13.60	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	V-32	Cushman Rd	8.40	Public supply watershed	Excellent	No	High	RR/FC

Amherst Water District	U-26	Sand Hill Rd	9.12	Public supply watershed	Excellent	No	High	RR/FC
Amherst Water District	ZT-3 (T-3, T-4, T-11, T-12, T-14, U-5; V-12, V-13, W-3, W-7, W-8, W-11, W-12, W-13, W-14, W-29, W-31, W-33, W-47, X-1, X-2, X-3)	January Hills Rd	266.70	Public water supply	Excellent	No	High	RR/FC
Total			**532**					

*Note: In the Zoning column, FC = Forest Conservation District, RR = Roadside Residential District, LW = Lake Wyola District, and TC = Town Center District.

Source: Town of Shutesbury Tax Assessors' Records, 2021

D. NON-PROFIT PARCELS

D.1 Non-profit-Owned Permanently Protected Parcels

In 2020, Kestrel Land Trust acquired the 135-acre property bequeathed to them by Julian Janowitz. Now called Julian's Bower, the publicly accessible property contains the 22-acre Ames Pond, five miles of trails, and Julian's wood, glass, and stone sculptures.

D.2 Non-profit-Owned Cemeteries with Permanent Protection

The Jewish Community of Amherst owns a 2.2 acre cemetery on Leverett Road assumed to be permanently protected by nature of its use.

E. UNPROTECTED LANDS OF CONSERVATION INTEREST

There are a number of nonprofit, institutional, and utility land holdings that are used for recreation or conservation purposes in town but are considered to have no protection from development. These lands are not included in the total acreage count of lands under some form of protection. The following is not an exhaustive list of properties in Shutesbury with recreation or open space value that currently have limited to no protection.

Shutesbury Athletic Club (3 acres). Although privately owned, it is worth noting that this site has value as a place for meetings and events held by various community groups. The property is centrally located in town and has an outdoor picnic area suitable for barbecues. The venue hosts many community events, including fundraisers, fairs, music, and dinners.

Lake Wyola Association Building (1 acre) and beaches. The Lake Wyola Association Building is a meeting hall used in summertime for many Association events that are open to the public, such as steak roasts, beer fests, movies, and the famous 5K road race. Three small private beaches on the shoreline of Lake Wyola are used by Association members for swimming, picnicking, and canoe/kayak access.

Pine Brook Camp and Conference Center (Camp Anderson Foundation) (37.5+ acres). This area is located on the northern side of Lake Wyola and abuts Lake Wyola State Park. These undeveloped parcels are part of a Christian camp started in 1930s. Other parcels include camp buildings. The total acreage of the camp is 120 acres in Shutesbury and Wendell.

Morse Hill Outdoor Education Center (51.5 acres). This area consists of largely undeveloped, wooded parcels with an outdoor education theme, including rope courses in tall pines and camping. There are a couple of permanent buildings and a yurt. The parcel's northern boundary abuts the Sawmill River and the parcel is part of the Lake Wyola watershed. This area adds to the outdoor recreation options in the Lake Wyola area.

Robert Frost Trail. This is a regional hiking trail originating in Amherst that traverses the southwestern corner of town. It passes through private property, with permission of the landowner, and Amherst watershed land near Atkins Reservoir.

New England National Scenic Trail. The New England Trail was designated in 2009. It extends from Long Island Sound in Connecticut to the Massachusetts/New Hampshire border. The trail was rerouted to a different part of Shutesbury because of private landowner concerns. The new route in Shutesbury (Sections 12-15) comes up the eastern side of town, on land owned by DCR and other willing landowners.

F. RECREATIONAL RESOURCES AND OPEN SPACE EQUITY

One dimension of environmental equity is the distribution of open space. This is somewhat difficult to evaluate in a town like Shutesbury, where most residences are spread out along the rural roads in town. Shutesbury's public recreation areas are predominantly located in Shutesbury Center and on Lake Wyola on the north edge of town. Outside of these locations, large tracts of publicly accessible land scattered throughout town allow a diversity of active and passive

recreational activities, though the potential for access permission to change on private property is a key concern of residents. The vast majority of residents own cars and can drive to reach those open space and recreation resources. A number of town residents live within walking distance of those amenities via roadways, however very few pedestrian accommodations exist on Shutesbury roads. Given these limitations, there is minimal access to open space in Shutesbury for residents unable to drive or hike. And while there is an abundance of public, state or Town-owned land, many Shutesbury residents reported on the 2021 Open Space and Recreation Survey that they don't know about their options or are unsure of what they have permission to do. One relatively simple way to improve open space equity in Shutesbury would be to publish easily accessible information about publicly accessible Town-owned lands and trails.

G. CRITERIA FOR OPEN SPACE PROTECTION

As part of a blueprint for conserving open space and recreation land in Shutesbury, developing criteria to identify and prioritize land for conservation (as well as for development) could help focus Shutesbury's conservation efforts and better prepare Shutesbury to make decisions about land coming out of Chapter 61 for which the Town can exercise its Right-of-First-Refusal. A systematic approach, including applying criteria, enables Shutesbury to be strategic in its allocation of program funds by giving the Town a tool to both proactively identify parcels and resources that meet the goals of the open space plan, and to analyze the merits of individual parcels of land and projects as they present themselves.

Criteria for rating open space are unique to a community. The following process, derived from work developed and generously shared by the Town of Warwick, is presented as a stepping off point for Shutesbury's Open Space Committee to use and modify to suit the town's unique resources.

G.1 Developing Criteria

The criteria developed for calculating the conservation value of a parcel in Shutesbury should have strong consideration toward its ecological function. Parcels with ecological value, such as important hydrology, unfragmented forest, significant species or habitats, or potential to act as a critical linkage, can be identified and prioritized using the ecological identification and prioritization mapping tools described in *Section 4.B: Documenting and Mapping Ecosystems*. However, state-wide ecological mapping tools do not capture the recreational, scenic, and historical/cultural significance of a place to the people who live there. Consideration of additional, non-ecological values provide a holistic assessment of which parcels have the most value on the whole to the community.

Ecological Assessment

See *Section 4.B: Documenting and Mapping Ecosystems*.

Recreation Resources

a) Trail Corridors – Land that would contribute to the creation of a comprehensive trail network including parcels that form linkages with an existing or planned trail system.
b) Scenic Views – Land that preserves the viewshed of outstanding views.
c) Water Resources – Land that would provide access to Lake Wyola or other waters for swimming, canoe and kayak put-ins and fishing.

Scenic Resources

a) Views Across Fields – Roadside views across fields are an important scenic amenity in Shutesbury; their scenic value reinforces the importance of protecting agricultural fields adjacent to Town roadsides.
b) Views of Ridgelines – Shutesbury has some undeveloped ridgelines that are an important part of the Town's rural scenery. Maintaining undeveloped ridgelines benefits both the scenic value of the Town and the quality of the wildlife habitat. Maintaining undeveloped ridgelines could potentially become more challenging as the market for new homes rebounds.

Historic and Cultural Resources

a) Historic Landscapes – Historic landscapes and certain areas of town that wish to remain undiluted by incongruously modern construction to preserve the town's historic heritage.
b) Historic Farmsteads – Where original farmhouses, barns and outbuildings, stone walls, and fields remain intact, each may be an historic artifact considered for inventory and preservation.

G.2 Simultaneous Highest Priorities and Open Space Protection Opportunities

The open space criteria categories listed below are not listed in any particular order, given that Shutesbury may have high priorities in different open space categories simultaneously. The highest priorities would represent projects of such high value that the Town may want to raise funds in order to accomplish them; whereas with lower priority projects, the Town might not be willing to expend funds but would consider accepting the gift of a conservation restriction or trail easement if it were donated by the landowner.

Shutesbury might include parcels of land that are high priority for open space protection in several different categories simultaneously. In this scenario, it is the availability of opportunities that will control which projects are undertaken. Open space protection can move forward only when a landowner is interested in conserving their land or when funding is available to pay full market value when critical parcels come on the open market.

G.3 Preferred Type of Open Space Protection to Retain Private Ownership

Given concerns about keeping land on the tax rolls, the ideal form of open space protection for the future is the purchase of conservation restrictions and trail easements (in which private landowners agree to allow the public use of a trail that passes through their land). In this way, the land itself

remains in private ownership and stays on the tax rolls. An open space and recreation budget stretches further when it is possible to purchase just a restriction or trail easement, rather than having to pay for the entire parcel.

G.4 Implementing Open Space Criteria

Once a set of criteria have been defined and adopted, the Open Space Committee could move forward with related objectives and action items in *Section 9: Seven-Year Action Plan*.

SECTION 6

COMMUNITY GOALS

A. DESCRIPTION OF PROCESS

In November of 2020, an Open Space Committee was formed with the primary goal of working with the Franklin Regional Council of Governments (FRCOG) to update the 2012 Open Space and Recreation Plan (OSRP). Between November 2020 and December 2021, the Committee and the FRCOG worked to develop this Open Space and Recreation Plan using several methods for involving public participation, including:

- The Open Space Plan Committee held nine virtual meetings open to the public to discuss the various sections of the plan and maps.
- On June 4, 2021, FRCOG staff and the Open Space Committee launched the 2021 Open Space and Recreation Survey. The survey was open until June 28, 2021. An electronic version was made available via link to SurveyMonkey. Printed copies were distributed to Town Hall, Spear Memorial Library, and were available at Annual Town Meeting, held June 12, 2021. The electronic version was advertised on the paper survey and via the:
    - Town website
    - Town newsletter (mailed to approximately 700 households in Shutesbury)
    - Town digital announcement system (email notification)
- On December 16, 2021, FRCOG staff facilitated a virtual public forum. Participants were invited to review and discuss the inventory of conservation lands, community and environmental analysis, draft maps, community goals and objectives, and the Seven Year Action Plan priorities. Public forum notices were published in the following locations:
    - Town website
    - Town digital announcement system
    - The Greenfield Recorder
- The plan's public review period from December 9th to 23rd, 2021 invited submission of public comment via email to FRCOG staff. The public was invited to comment on a full draft of the plan and on the draft maps, both available on the Town's website.

One hundred and eighty-four (184) residents completed the survey and FRCOG staff prepared a summary of the results, which are included in Appendix B. XX residents and Town staff attended the virtual public forum. The attendees included a high percentage of representatives from the _____. During the two-week public review period before and after the public forum, XX residents submitted comment. All public comments were recorded in *Section 10: Public Comment*, reviewed by the Open Space Plan Committee and were incorporated into the plan when appropriate.

B. STATEMENT OF OPEN SPACE AND RECREATION GOALS

Shutesbury's extensive forest will remain intact and well protected — with a high degree of public access — as a result of cooperative efforts between the Town, private landowners, local and state agencies, and non-profit organizations. These forests will help to maintain the peace and quiet, clean air and water, wildlife habitat, climate resilience, and distinctly rural character of Shutesbury. Important wildlife habitat will continue to be identified and protected. Existing pollinator habitat will be expanded to protect the insects essential to natural biodiversity and agriculture; invasive species will also be monitored and responded to where possible to protect critical habitat. Expanded land protection and public trail access will remain largely under private ownership and control, continuing to provide income to the Town via property taxes.

Shutesbury residents will have year-round options for going out on well-marked trails near their homes that are part of a trail network that links the far corners of town, when possible. Information about trails and planned community hikes will help new users get comfortable with the trail system. Residents will also be able to enjoy the many recreational activities available on Lake Wyola. Those who visit Shutesbury will also continue to enjoy the environment, where they are welcome to swim, hike, bike, ski, boat, hunt, snowmobile, and more. Historic and cultural sites throughout town will be well protected, balancing the desire for the public's wish to be able to appreciate the sites and the need to protect historical and natural resources from human impact.

In Shutesbury center, a new library, community gardens, and expanded recreational facilities will act as cultural and community anchors, providing places for people to gather and do activities together. Pedestrian travel in the village will be safer. The Town will increase its education and outreach efforts to better inform residents about sustainable land use practices and recreational opportunities, especially using the Town website and the Spear Memorial Library. Residents will lead each other in walks/rides, talks, town-wide celebrations or friendly competitions that utilize and celebrate open space and recreation resources.

Shutesbury will apply to all of its planning and development activities the latest Massachusetts guidelines on climate change resiliency and adaptation, including priorities from the 2020 Shutesbury Municipal Vulnerability Plan and 2021 Shutesbury Hazard Mitigation Plan. Thanks to the work of Town staff and committed volunteers, Shutesbury will implement projects that enhance the environment, create more resilient land use and development, communicate clearly about the impacts of climate change in the community, and improve both public and private open spaces for the enjoyment of people locally and regionally.

SECTION 7

ANALYSIS OF NEEDS

The 2022 Shutesbury Open Space and Recreation Plan (OSRP) incorporates the inventory of land-based natural, recreational, scenic, and cultural resources in town (Section 4), identifies parcels under some level of protection that contain these or other recreational resources (Section 5), and articulates the community's general goals (Section 6). Drawing on feedback generated by the 2021 Open Space and Recreation Survey and the Public Forum, the American with Disabilities Act (ADA) Self-Evaluation and Transition Plan, findings from Sections 3, 4, and 5, and the results of the Town's recent hazard mitigation and municipal vulnerability preparedness planning, this chapter makes connections between the needs of the community, the resources available, and opportunities for improvement. Additionally, this section addresses potential obstacles to the effective resolution of these needs, including organizational barriers and the most significant land use challenges related to recreation, open space, and natural resources.

In 2017, the Commonwealth completed the Statewide Comprehensive Outdoor Recreation Plan (SCORP), *Massachusetts Outdoors 2017*, an update of the SCORP 2012 five-year plan. SCORP plans are developed by individual states to be eligible for grants from the Federal Land and Water Conservation Fund (LWCF) and serve as a tool in planning for future needs and uses of outdoor resources. Informed by their survey of Massachusetts residents, as well as priorities identified in municipal open space and recreation plans, the SCORP identified the top four outdoor recreation goals for the state as:

- Access for underserved populations,
- Support of the statewide trails initiative,
- Increased availability of water-based recreation, and
- Support of the creation and renovation of neighborhood parks.

Although Shutesbury has developed its own distinct set of priorities, some of its needs intersect with the themes of the statewide goals. These connections are highlighted throughout this section.

As the climate crisis continues to unfold, the present and potential impacts of climate change on the environment, people, and the local economy are coming into focus in small communities like Shutesbury. A recent update to the Town's Hazard Mitigation Plan (HMP)[1] and the

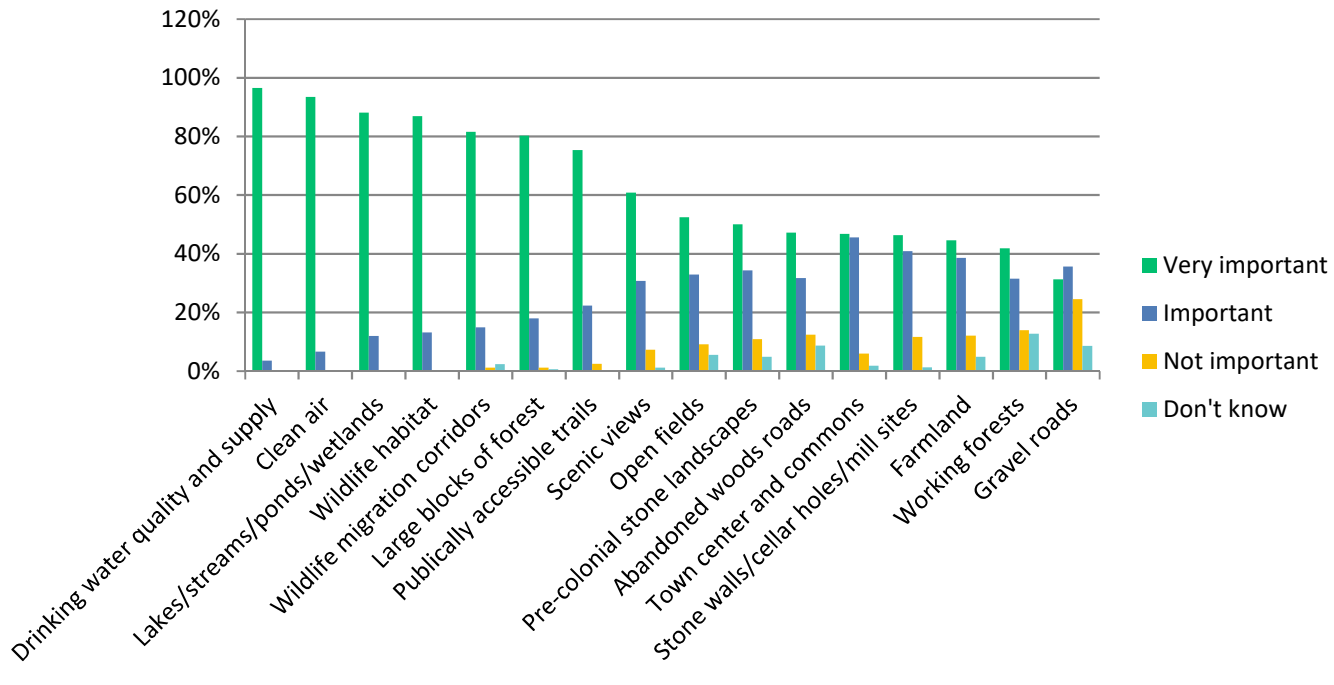
[1] Town of Shutesbury. *Town of Shutesbury Multi-Hazard Mitigation Plan*, 2021: url

preparation of the Municipal Vulnerability Preparedness Plan (MVP)[2] helped raise awareness and bring the community together to talk about climate change and its effects in Shutesbury. As detailed in *Section 4. Environmental Inventory and Analysis*, natural systems play an important role in mitigating and adapting to future climate change, but they are also highly vulnerable to its impacts. Local decisions about how land is used and how ecosystems are managed will profoundly affect how Shutesbury adapts to the challenges of climate change. Opportunities to promote and improve mitigation and resilience are described throughout this section, where relevant.

A. SUMMARY OF NATURAL RESOURCE PROTECTION NEEDS

One hundred eighty-six residents completed the 2021 OSRP survey, the results of which are summarized in *Appendix D*. When asked in the 2021 survey how they would prioritize their top three open space categories, either via protection, access, or improvement (Q14), survey takers prioritized open space resources in the following order:

Figure 1: Open Space Priorities Survey Responses (168 responses)



The results show that residents value the protection of Shutesbury's most basic natural elements – water, air, water bodies, wildlife habitat, as well as large blocks of forestland and intact waterways that facilitate species migration. Shutesbury residents also highly value the trails and woods roads that allow them to enjoy the outdoors, as well as open fields and other scenic views.

[2] Fuss & O'Neill. Town of Shutesbury *Community Resilience Building Workshop: Summary of Findings*, 2020: https://www.mass.gov/doc/shutesbury-report/download

The following section outlines key natural resource protection needs in Shutesbury. Trails and wayfinding will be addressed in *7.B: Summary of Community Needs*. Specific objectives and strategies for addressing natural resource needs are described in *Section 8: Goals and Objectives* and *Section 9: Seven-Year Action Plan*.

A.1 Forests and Wildlife Habitat

One of the greatest ecological strengths of Shutesbury's landscape is the prevalence of large, contiguous forest blocks. The interior forest, intact wetlands in undeveloped areas, and forested streams containing fish habitat constitute some of the more valuable habitat in Shutesbury. Furthermore, connected forest both increases forest resiliency and provides important wildlife corridors. Most of these large forested areas are working forests managed for timber or water supply. However, many forest parcels are still family-owned and managed. The Department of Conservation and Recreation's Forest Stewardship Program is an important resource property owners for long-term, sustainable forest management and stewardship.[3]

Close to 60 percent of the Town's land area is permanently protected open space. A good portion of what the state identifies as Core Habitat is permanently protected by state agencies and watershed districts. However, large areas in southwest and northwest Shutesbury remain only temporarily protected. Much of the forestland is owned and actively managed by a local forestry company, WD Cowls. As the value of Shutesbury's forested habitat is in interior forest within large connected blocks, land protection efforts aimed at filling in gaps in these protected habitat areas will preserve and build on what already exists. Many Shutesbury residents are concerned about how development of forest resources, including solar development, might impact the ecological integrity of surrounding forests.

Pressure for housing development in Shutesbury has been low since the 2000s. The Town's zero population growth and modest tax revenues have become a strain on municipal services. Stable population, limited capacity for water and sewer, and zoning bylaws that protect interior forest suggest that residential and commercial development will not increase, at least dramatically, in the future. Yet the availability of high-speed internet, possible in-migration driven by climate change, and the Covid-19 pandemic may shift development trends in the medium- or long-term. To limit future development in unprotected sensitive ecological or valued open space and recreation areas, the Town of Shutesbury could evaluate its process for exercising its Right-of-First-Refusal for land coming out of Chapter 61. Although Shutesbury's zoning bylaws are some of the most progressive in the state in guiding new development away from forested areas and toward roadsides and the village center, there is a need for continual review of zoning and subdivision regulations to assess how well they protect the function of natural systems and encourage development that adequately anticipates the challenges of climate change.

An immediate habitat need in Shutesbury that can be implemented at the small scale is the protection and expansion of pollinator habitat. Even though forest covers most of Shutesbury, roadsides and threads of neighboring residential gardens can act as habitat corridors between

[3] https://www.mass.gov/service-details/forest-stewardship-program

important pollinator resource areas, such as meadows and waterbodies. There is a need to educate residents and municipal staff to increase awareness of the rapid decline of native pollinators and corresponding need for habitat protection. Working with the Highway Department for effective management of pollinator resource areas (including the timing of mowing and spraying) and incorporating pollinator habitat into public parcels in Shutesbury Center, such as at the new library and community garden projects, could support pollinator populations in Shutesbury.

Shutesbury faces the growing burden of invasive species in its natural areas. Increasing awareness and education among Shutesbury residents about prioritizing and tackling invasive plant problem areas could help preserve important intact ecosystems and valued outdoor areas. The Town Highway Department can play a role in establishing how roadsides are managed for invasives, especially when doing roadwork. There are also resources available for identifying which areas are most in need of protection from invasives and developing strategic management plans.[4]

A.2 Water Resources

Shutesbury's waterways are generally small, upland streams. There is a need to give priority to upgrading culverts and other road infrastructure in order to prevent erosion and sedimentation caused by undersized culverts and to improve under-road passage of both aquatic and terrestrial animals. Implementing additional rural road stormwater best management practices and low-impact development techniques in developed areas will help protect waterways and infrastructure as heavy precipitation events increase with climate change.

With the exception of Lake Wyola, Shutesbury's several lakes, ponds, drinking water reservoirs, and wetlands are minimally impacted by development and are in good condition. Lake Wyola is impaired by excess phosphorus and nutrients caused by surrounding land use and stormwater runoff issues. Improving the water quality in Lake Wyola will likely require cooperation between the Lake Association, Lake Wyola Advisory Committee, and the Town to minimize the impacts of septic systems and stormwater runoff, especially in residential neighborhoods on the west and northern sides of the lake. Given that the residential area around Lake Wyola is the most densely populated part of town, it is important that the community continue to make an effort to balance management of the lake as a well-functioning recreation resource with its protection as an ecological system.

Clean drinking water continues to be a concern in Shutesbury as road salt, PFAS chemicals,[5] and sedimentation after high rain events impact public and private wells. Due to the uncertainty of the relationship between groundwater in the overburden and bedrock, the most prudent

[4] University of New Hampshire. *Picking Our Battles: A Guide to Planning Successful Invasive Plant Management Projects*: https://www.wildlife.state.nh.us/invasives/documents/picking-battles.pdf

[5] Per- and polyfluoralkyl substances (PFAS) are man-made chemicals (including PFOA, PFOS, GenX, and others), also known as "forever chemicals", that persist in the environment and human body and are hazardous to human health. PFAS are found in a wide range of ordinary consumer products and in drinking water.

approach to protecting water quality is to make sure that septic systems are designed properly (in accordance with the Title 5 Regulations) and that extra care is taken to prevent or minimize improper disposal (flushing or pouring into a sink) of household hazardous waste and pharmaceuticals. Keeping water clean everywhere in Shutesbury is very important to residents, but Shutesbury residents are also stewards of a vast area of public water supply and are thereby responsible for the public health of Massachusetts residents beyond their Town borders. The permanent protection of forests from development will do much towards ensuring that brooks and streams will continue to be home to a diverse array of plants and animals and that the associated wetlands will continue to exist to help slow floodwater energy.

Status of the water supply is an emerging concern among residents, given the increased frequency of droughts and the limited options for surface water sources for firefighting. Because the bedrock aquifers have not been thoroughly mapped and assessed, it is not possible to produce any long-term projections of water supply. Although the Town may wish to focus some of its future land acquisition efforts on areas containing stratified drift deposits for potential future community water supplies, detailed evaluations of the saturated thickness of the deposits and sizes of the recharge areas at potential well locations need to be made first to determine if these areas would be adequate.

A.3 Scenic and Cultural Resources

Residents have identified many important natural and historic resources in Shutesbury that include both pre-colonial landscape artifacts and post-colonial sites. When asked about valued historic/archeological areas that they thought should be acquired or protected, 25 respondents favored protection, 8 indicated they didn't think the Town should protect sites in any way, and 21 didn't know about local historic sites (Q15, open-ended, total 85 responses). Between the important natural sites identified in the 2012 Shutesbury Open Space and Recreation Plan and those in the 2021 survey (Q15), residents highly value the Dean Brook cascades, the high point off Carver Road, Footit's floating sphagnum bog, the bogs on Montague and Pelham Hill Roads, the "High Bridge" waterfall, Monks/Beehive Caves on Montague Road, Adam's Tomb, the Town Farm, the Town Pound, old foundations, stone walls, and cellar holes, pre-colonial ceremonial sites, and Meetinghouse Hill — the highest point in town. Many of these natural features are protected, but others may need further study and/or protection. The Town may also consider increasing the visibility of select historic and cultural sites; this could be done through the *Places of Interest* page on the Town website.

The protection of scenic views did not rank as a high priority among survey takers (Q15). Though there are few vistas, many of Shutesbury's roads are lined with stone walls that afford short-range views and contribute to the town's rural character.

Although agriculture is an important resource wherever it is found, there is only a small percentage of agricultural land in Shutesbury. Generally, Shutesbury soils don't lend themselves to agricultural use (over 80 percent is Prime I, II, or III Forestland Soils), so Shutesbury parcels in agriculture are therefore not as high a priority for protection as the farmland soils in the Connecticut River Valley. Public shade trees, another cultural resource in Shutesbury, have been impacted over the last few decades by storm damage or removal for storm damage mitigation

and improvements for driving visibility. The Shutesbury MVP Plan identified as a moderate priority the development of a tree and forest management plan that would address public shade trees.

Shutesbury Center (Jamie Malcolm-Brown)

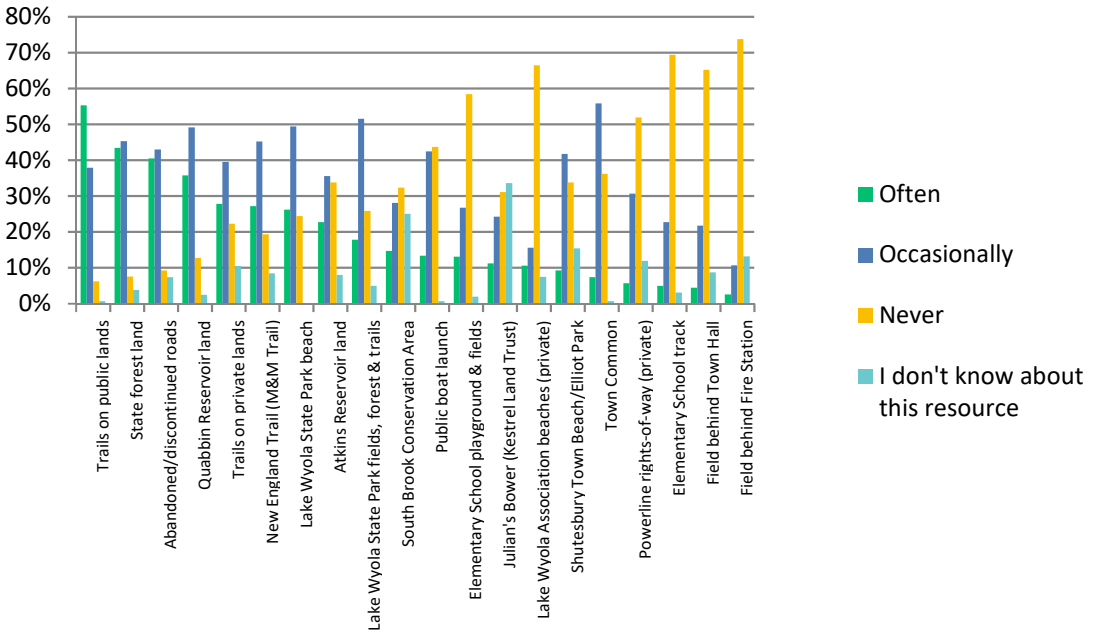
B. SUMMARY OF COMMUNITY NEEDS

Planning for a community's open space and recreation needs can address the present population's desires for new facilities, spaces, and services, while also interpreting and acting on available data to prepare for the future needs of residents. Although the Shutesbury OSRP will be updated in seven years, the types of actions that are identified in *Section 9: Seven-Year Action Plan* take into account the needs of the next generation as well. The following section presents results of the 2021 OSRP survey related to the outdoor recreation interests and needs of Shutesbury residents, as well as what actions may be taken to meet those needs.

Given the extremely limited recreation facilities, it is not surprising that Shutesbury's survey respondents predominantly use passive recreation areas (areas where recreational activities do not require facilities like sports fields or docks) over active recreation areas (areas where facilities are required) (Q9 - see Figure 2). Trails and publicly owned forestland (and the discontinued roads within them) are the most often used recreation areas, followed by the various facilities around Lake Wyola, including the State Park Beach and public boat launch.

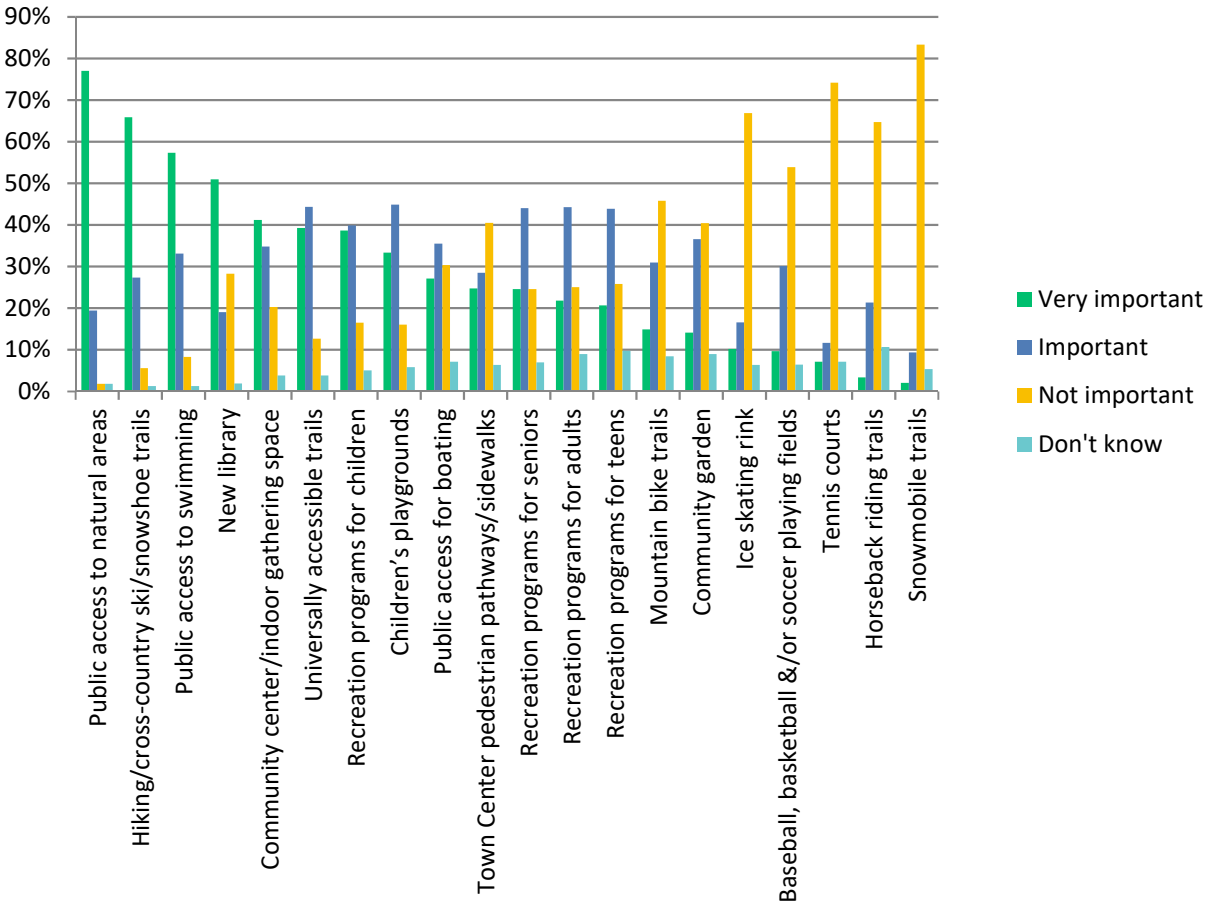
Generally, it appears that Shutesbury residents' use of public access trails is spread throughout town, without heavy use of any single recreation area. When asked where they hike, the top answer was "trails near my house" (Q5, open ended). For those who mountain bike (25 percent of total survey respondents), no single mountain bike area was used significantly more often than others. Sixty-three percent of respondents stated that they had increased their use of open space and recreation opportunities in Shutesbury as a result of the Covid-19 pandemic, but the responses did not show clearly where that increase occurred. When asked where they swim, 82 percent of respondents answered that they swim at Lake Wyola (Q6, open ended). Recreation areas in the Town center, including the Elementary School track and playground, and fields behind the Town Hall and fire station were little used in comparison to trails and the lake.

Figure 2: How often do you use the following open space and recreational resources in town? (169 responses)



When asked about the importance of various recreation resources, the results show that access to trails for various types of recreation, universally accessible trails, and swimming top the list, as does a new library or other indoor community gathering space (Q8 – see Figure 3). Recreation opportunities for children and public access for boating were also selected by over 50 percent of respondents.

Figure 3: How important are the following recreation resources to you? (168 responses)



B.1 Trails

Given how important trails are to Shutesbury residents, there is a need for more comprehensive planning for connecting, expanding, and maintaining the existing trail systems. Many trails cross private land and could benefit from formal public-access agreements or easements, where possible. Shutesbury could consider holding a "trail summit" to bring together the various stakeholders, identify trail user and landowner needs, and thoughtfully plan the next steps for improving the trail network. Developing a plan for recreational trails was in fact tied with a new library for the most-needed open space or recreation project in town (Q18, open ended). Concern about reliance on public access to private land was also a concern of respondents (Q11, open ended). Some specific suggestions came out of a question about access to recreation areas, including a request for better parking at popular hiking areas. In addition to enhancing the experience of Shutesbury residents, trail planning would support the development of the

statewide trail network identified in the SCORP.

There is also a need to create trail maps and provide more trail information to the public (Q10, open ended). Potential trail users want to know which trails are okay to use, their quality, and how accessible they are. They also want better-marked trails. Improving these resources can improve recreation and open space equity by making trails more accessible to all residents.

Survey takers also identified a need for a handicap-accessible trail, as there is currently none in Shutesbury. The Open Space Committee noted that there is potential to create an accessible trail at the South Brook Conservation Area, a Town-owned property actively managed by the Conservation Commission. There is room for a couple of parking spaces at the Lake Wyola Conservation Area Randall Road entrance that links to the South Brook Conservation Area Trails. A consultant mapped the trails of the adjoined conservation areas in 2021 with the intent that the Conservation Commission determine the best uses for each trail and develop an accessible trail that meets ADA standards. Access to trails for people with limited mobility aligns well with the SCORP's goal of improving recreational access for underserved populations.

B.2 Lake Wyola

There are three Town-owned public access points to Lake Wyola — the Lake Wyola Recreation Area on Randall road (including Elliott Park, formerly the Old Town Beach), the Top of the Lake Park on Merrill Drive, and the Garbiel Gift Property on Cove Road/Shore Drive. There is also a state-run public beach on Lakeview Road called the Lake Wyola State Park/Carroll A. Holmes Recreation Area. Some survey respondents mentioned wanting more access to the lake (Q10). Given the number of public access areas that do exist, it may be in the community's best interest to maintain and improve the existing public use areas rather than to create more. Specific suggestions from survey respondents for improvements at Lake Wyola include a place to keep personal kayaks and improvements to the Town's public boat ramp. The overall objective of improving access to Lake Wyola aligns well with the SCORP's goal of increasing the availability of water-based recreation.

The Town is currently pursuing some improvements to its public access areas and has conceived of additional improvements. The Highway Department plans to install two parking spaces at Top of the Lake Park. The Town also hopes to install an ADA compliant path to the water. It is possible that either Elliott Park or Top of the Lake Park may be an appropriate location for a public kayak tie-up area, but the risk of vandalism is giving the community pause.

B.3 Recreation Facilities

Shutesbury residents are accustomed to leaving town for activities that require recreational facilities. If more active recreation areas such as a playground available during school hours, a ball field, a tennis court, or a skating rink were built in Shutesbury, it is very possible that these spaces would get adequately used and even help attract or retain residents.

Accommodations for elderly Shutesbury residents is limited. There is a senior lounge in the

Town Hall, but there are no universally accessible trails in town. Shutesbury is in the process of becoming an Age-Friendly Community, a network that recognizes the need for planning and policies that consider the needs of citizens of all ages. Age-friendly planning principles could be granted additional consideration in the design of the proposed new library, accessible trails, community garden, and any other public sitting area, such as the parks around Lake Wyola.

B.4 Community Gathering Space

When asked if there was a specific recreational area or facility that respondents would like to see Shutesbury develop or improve (Q11, open ended), a library garnered the largest response (17). A community center was also mentioned four times. Responses throughout the survey give the sense that Shutesbury residents want a place to come together. When well designed and programmed, community gathering spaces help strengthen a sense of community, as the farmers' market and current library do. The community garden under development may serve this purpose. A library that can accommodate a space large enough for community gatherings, provide programming, be a source of information, and include trails on its property could have a central role in this kind of community building. Clustering these various "community creating" spaces and recreation spaces could amplify their value to the town.

Aside from public beaches on Lake Wyola, teens specifically lack a gathering space in Shutesbury. Most teen gathering spaces are found in the neighboring towns of Amherst where and Hadley. Revival of ball fields behind the Town Hall could create an outdoor space for pick-up games and training. The teen population of Shutesbury is too small to recommend a standalone gathering space, but a new library could accommodate space for teens to study, play games, and participate in structured programming.

B.5 Pedestrian Safety and ADA Accessibility

Survey respondents also identified a need for sidewalks and other improvements to pedestrian safety (Q11, Q18, open ended). The 2021 Regional Pedestrian Plan recommends traffic-calming measures to reduce vehicle speeds in areas of pedestrian activity. It also recommends an assessment of the need for sidewalk construction and/or wider shoulders to better accommodate pedestrians and bikers.[6] Shutesbury recently adopted a Complete Streets Policy and can become eligible for funding to improve pedestrian and bike safety after completing a Complete Streets Prioritization Plan.[7]

The 2021 ADA Self-Evaluation and Transition Plan (*Appendix C*) names a number of short- through long-term actions that would bring Shutesbury recreation facilities up to ADA standards. Recommendations generally address the need for designated accessible parking

[6] FRCOG. *Regional Pedestrian Plan for Franklin County*, 2021: https://frcog.org/wp-content/uploads/2021/11/Pedestrian-Plan-for-Franklin-County-2021.pdf

[7] Shutesbury Complete Streets Policy: https://www.shutesbury.org/sites/default/files/files-and-images/policies%20and%20guidelines/Policy%20191029_CompleteStreetsPolicy.pdf

spaces and accessible paths. The plan notes that the school playground requires a different surface under play structures, an area of improved pathway, a modification to a ramp, and more visible accessible parking signs to comply with ADA standards.

B.5 Programming

According to the survey, there is general overall satisfaction within the community with programming options for seniors, adults, and children. This indicates that the community is satisfied with the programs for children and adult exercise classes regularly hosted by the Spear Memorial Library. Half of the survey respondents, however, were dissatisfied with options for teenagers, for whom most programming is available only through schools located outside of Shutesbury. While the regional high school provides a variety of afterschool programming for teens, the library could explore providing out-of-the house opportunities for teens during school breaks and summer.

Older Shutesbury residents are supported with programming through the Council on Aging, which hosts events such as potlucks and foot clinics. The Spears Library also hosted exercise classes throughout the pandemic via Zoom. Less than ten percent of survey responses indicated that the public is dissatisfied with program options for seniors, so there are no specific needs identified at this time.

When asked about specific recreational programs (Q13, open ended), survey respondents again promoted the improvement of trails, trail maintenance, and trail publicity. They also identified group hikes or a hiking club as a desired program. Nature programs and walks, establishment of the community garden, and swim lessons were also recommended. The community garden is under development and programming could be promoted around its use.

Community groups or members interested in facilitating public hikes and educational walks could promote them through the existing library activities platform. These kinds of outdoor activities could also be paired with promotion of Shutesbury conservation and recreation areas via the Town website and newsletter. For example, a different recreation or historic resource could be spotlighted in the newsletter with an associated public hike each month. Outdoor activities open to all help connect people and foster a sense of community.

C. SUMMARY OF MANAGEMENT NEEDS

Projects and scheduled activities provided by the Town rely heavily on individuals and volunteer committees. Although volunteer work has the positive effect of energizing residents toward a common cause and making needed improvements to the Town's systems, infrastructure, and landscape, it can often be difficult to sustain a volunteer base for committee and project work. Regardless, for the Shutesbury Open Space and Recreation Plan to have a meaningful impact in Shutesbury over the next seven years, a fully populated standing Open Space Committee must exist to steward the priority actions to completion. Coordination between a standing Open Space Committee and the newly regrouped Recreation Committee could be a valuable first step toward convening a "trail summit" and coordinating trail work. Specifically, there is need for a volunteer group to maintain and manage trails on the Town-owned South Brook Conservation

Area, which has the potential to be developed into an accessible trail.

Shutesbury boards and committees have a strong culture of communication and cooperation. It is imperative that this level of coordination be maintained on many of the topics important to natural resource protection, open space, and recreation in town: a) open space protection, recreation, and development, b) water quality and quantity, and c) management of Lake Wyola. The Town may enhance their communication by collaborating on an annual climate change report.

For existing recreation resources to meet the needs of Shutesbury residents, there is a need for clear and broad availability of information on recreation opportunities, both digitally and in print. This is especially true of trails, but the community may benefit from readily available resources on land protection, land stewardship, and Town grant guidelines and deadlines, among other topics.

SECTION 8

GOALS AND OBJECTIVES

The following goals and objectives were formulated from the results of the 2021 Shutesbury Open Space and Recreation Plan Survey and reviewed and modified through the public meetings of the Open Space Committee, the public forum process, and public comment period. All of the goals and objectives will be pursued and implemented within the context of increasing and strengthening Shutesbury's resiliency to climate change.

GOAL A. PROTECT SHUTESBURY'S NATURAL RESOURCES — CLEAN AIR, CLEAN WATER, LARGE FOREST BLOCKS

A.1 Prioritize the protection of lands that contain and support the function of natural, recreational, and cultural resources in Shutesbury.

A.2 Use Shutesbury's land use regulations to increase protection of valued natural and cultural resources, and to support climate change mitigation and adaptation strategies.

A.3 Protect the availability and quality of drinking water resources.

A.4 Sustainably manage stormwater to reduce harm from polluted and erosive runoff to groundwater, surface waters, and public and private infrastructure.

A.5 Manage ecosystems for their many benefits, including biodiversity, habitat, stormwater management, climate resilience, and carbon sequestration.

GOAL B. BUILD AND ENHANCE COMMUNITY IN SHUTESBURY

B.1 Preserve and enhance public community gathering spaces.

B.2 Improve trails and trail systems, ensuring useful trail connections, improving public access, and establishing universal accessibility.

GOAL C. ENHANCE RECREATION OPPORTUNITIES IN SHUTESBURY

C.1 Provide recreation options for residents of all ages and abilities.

C.2 Enhance water-based recreation options for residents.

C.3 Improve pedestrian access and safety.

GOAL D. CREATE THE ORGANIZATIONAL FRAMEWORK FOR ACHIEVING GOALS FO THE OPEN SPACE AND RECREATION PLAN

D.1 Follow through with the action items identified in this 2022 Shutesbury Open Space and Recreation Action Plan.

D.2 Improve public awareness among Town departments and residents of environmental issues, natural resource protection, climate change, open space, recreation, and multi-use trails through effective systems of communication.

Sculpture at Julian's Bower (Susan Loring-Wells)

SECTION 9

SEVEN-YEAR ACTION PLAN

The Seven-Year Action Plan outlines actions that fulfill the Open Space and Recreation Plan (OSRP) goals and objectives. By implementing the recommended actions, each goal and objective will be closer to realization.

Implementing the OSRP will not only require the participation of the Open Space Committee, but it will also necessarily involve many other town groups, including the Select Board, Town Assessor, Planning Board, Conservation Commission, Historical Commission, Highway Department, Board of Health, Recreation Committee, Lake Wyola Advisory Committee, Community Preservation Committee, Water Resources Committee, Tree Warden, and Library Board of Trustees. In addition, UMass Extension is listed as a potential resource for technical support.

In addition to limitations in funding, many of these actions may be constrained by a lack of volunteer time. Where money is required, such as with open space protection, it does not have to be provided by the Town alone. State and federal agencies, private non-profit conservation organizations, individual donors, and private foundations are potential sources of funding. Many are more likely to invest in projects that have a broad base of community support.

Two recent planning efforts undertaken by the Town provide important points of leverage and overlap with the OSRP. In 2020, Shutesbury engaged in the planning process to become designated a Municipal Vulnerability Preparedness (MVP) community. Shutesbury also updated its five-year Hazard Mitigation Plan (HMP) in 2021. Both the HMP and the MVP Plan include a discussion of climate change and the natural hazards that are increasingly impacting Shutesbury's natural environment as well as the important ecosystem services that floodplains, rivers, wetlands and forests provide. These plans include strategies and action items to address and mitigate impacts from climate change and from natural hazards and to protect and restore the town's natural resources.

A number of actions identified in the MVP Plan and HMP align with the OSRP's goals, illustrating the interconnectedness of the environmental issues we face today. Efforts to improve the health of natural resources have numerous co-benefits with climate resilience, flood resilience, climate adaptation, and the ability to enjoy these resources. Relevant action items from the MVP and Hazard Mitigation Plans are included in the OSRP Seven-Year Action Plan. Thinking creatively and designing a project to achieve multiple objectives and provide multiple benefits can expand the opportunities for funding. Some OSRP projects could be funded by the MVP Action Grant program, the FEMA hazard mitigation grant program, or a grant program administered by the Division of Conservation Services if open space preservation and/or recreation amenities are included in the project design. Actions similar to actions identified in the HMP or MVP plan are indicated in *Table 9-1:* Action Plan in the Plan Sharing Action Item column.

For the goals of an Open Space and Recreation Plan to be realized, it is important to establish which actions to prioritize for the first seven years. The Open Space Committee has selected a set of priority action items, which are represented on the *Seven-Year Action Plan Map* at the end of this section and outlined in detail in Table 9-1. The most important action steps for Shutesbury in the next seven years pertain to improving the land protection process in Shutesbury and making public trails more accessible"

Land Protection

- Use the Criteria for Open Space Protection (*Section 5.F Criteria for Open Space Protection*), available land conservation tools, the technical support of UMass Extension, GIS data and analysis, 2021 OSRP Survey results, and other available conservation tools to develop criteria the Town can use to identify priority areas to conserve when exercising its Right-of-First-Refusal for land coming out of Chapter 61.

- Continue to work with adjacent towns, local land trusts, the state, and willing property owners to permanently protect parcels identified as having high conservation value following the criteria developed in the above action.

- Revive the proper protocol for notifying relevant Town bodies of a property sale subject to Chapter 61 Right-of-First-Refusal.

Trail Access

- Create and maintain a central information site for public trails, recreation and conservation areas, and scenic and historic places of interest. Include resources for private landowners to learn about land protection and sustainable land management.

- Sponsor public walks, hikes, and/or workshops where residents of all ages can learn more about public access trails and the natural history of Shutesbury.

A. ACCOMPLISHMENTS

Despite being a small town reliant on a limited number of paid staff and dedicated volunteers, Shutesbury has accomplished a number of action items that support the goals of the Town's previous OSRP. The following list summarizes Shutesbury's accomplishments since the publication of the 2012 Open Space and Recreation Plan:

- In 2015, apportioned CPA funding to the West Cemetery Gravestone Preservation Project, which commenced work in 2020.
- In 2015, established the Top of the Lake Conservation Area on the north end of Lake Wyola. In 2019 and 2020, built stone steps, installed a boat launch and fence, and planted native shrubs (CPA funds).
- In 2015, made improvements to Elliot Park (formerly Old Town Beach), including the installation of a gazebo, garden, and racks for the Spear Memorial Library's kayak lending program (CPA funds).
- In 2016, funded a track and new playground at the Shutesbury Elementary School and rehabilitated the school's playground (CPA funds).

- In 2018, developed a plan for the removal of silt in the North Cove of Lake Wyola and for restoration to its historical depths. Removal has not been conducted.
- In 2019, commissioned a Wildlife Habitat Evaluation for Annual Winter Drawdown of Lake Wyola, completed by Stockman Associates for the Conservation Commission and Lake Wyola Advisory Committee.
- In 2019, commissioned the Conway School of Landscape Design to do a feasibility study of ecological designs for Town parcel O-32
- In 2019, re-formed the Recreation Committee to steward the community's playing field, playground, and equipment needs, create a community garden, and serve as a central point in a communication network for the topics of trail use and care, handicap accessibility, activities, beach use, and more.
- In 2019, adopted a Complete Streets Policy.
- In 2020, voted at Annual Town Meeting to revise the solar bylaws to increase protection of large contiguous blocks of forest.
- In 2020, revitalized the Open Space Committee for the purpose of updating the Open Space and Recreation Plan.
- In 2021, the Historical Commission authored an *Introduction to Indigenous Cultural Sites in Shutesbury, Massachusetts* and a report titled *Historical Preservation and Solar Development in Shutesbury, Massachusetts*.
- Ongoing: the Spear Memorial library regularly hosts and advertises events, acting as a community anchor point.
- Ongoing: the Lake Wyola Advisory Committee regularly tests water quality on the three beaches of the Lake Wyola Association as well as the state beach at Lake Wyola State Park.
- In process: using CPA funds, the Recreation Committee is establishing an 8-bed community garden to be opened in 2022.
- In process: the Town is overseeing the replacement of the Locks Pond Road culvert.
- In process: using CPA funds, the Conservation Commission hired a consultant to map the trail system in the Lake Wyola and South Brook Conservation Areas for the purpose of improving the trail system and its uses.

In addition, private non-profit entities have contributed to Shutesbury's open space and recreation goals:

- In 2019, the Department of Fish and Wildlife (DFW) acquired lots F105 and F3, located on Leverett Road and bisected by Roaring Brook. Lot F3 features an historic mill site and will be open to the public.
- In 2020, the Kestrel Land Trust protected Julian's Bower, 135 acres on Laurel Road containing Ames Pond. This property is now open to the public.
- In 2021, the 2,038-acre Walter Cowls Jones Working Forest was protected in Shutesbury, Pelham, and Leverett by the Department of Fish and Game.
- The Morse Hill Outdoor Education Center runs outdoor programs for children and provides employment in the outdoor recreation field. The Center recently opened Learn at Morse Hill, an outdoor alternative to elementary school.
- The Porcupine Ridge Runners Snowmobile Club maintains trails in Shutesbury, Leverett, Wendell, and New Salem to help provide safe and enjoyable winter recreation.

B. SEVEN-YEAR ACTION PLAN

HOW TO READ THIS TABLE:

- **Goals** are general concepts that articulate the vision of the community for itself. Goals are included as headers under which objectives are listed; the plan's goals and objectives are of equal importance and not listed in any kind of priority order.
- **Objectives** are milestones for achieving a goal. Objectives are listed in the far-left column of Table 9-1.
- **Actions** are concrete steps to be taken to fulfill objectives within a time frame.
- **Responsible Board/Group** suggests the Town group that would take the lead in shepherding the project, and coordinating with other involved groups.
- **Start Date** is the suggested start date, knowing that start dates can be adapted as needed. Actions are ordered by start date.
- **Plan Sharing Action Item** denotes whether an action with similar wording is also an action item in the Hazard Mitigation Plan (HMP) or the Municipal Vulnerability Preparedness Plan (MVP). For actions listed in the MVP plan, the priority ranking is also indicated. Actions carried over from the 2012 Shutesbury OSRP action plan are indicated with the term **2012 OSRP**.
- **Potential Funding** Sources are suggested starting places for funding; more details and URLs for each grant program can be found in *Appendix B* and should be applied for through the Community One Stop for Growth grant application portal.[1]

An approved Open Space and Recreation Plan qualifies a Town for Division of Conservation Services (DCS) grant programs, which include the Land and Water Conservation Fund (LWCF) Grant, Drinking Water Supply Protection (DWSP) grant, Local Acquisitions for Natural Diversity (LAND) Grant, and Parkland Acquisitions and Renovations for Communities (PARC) grant, among others.

Acronyms:

3C	MassDOT funding to FRCOG for Continuing, Cooperative, and Comprehensive (3C) transportation planning
ADA	Americans with Disabilities Act
BMP	Best Management Practice
CPA	Community Preservation Act
DCR	Department of Conservation and Recreation
DCS	Department of Conservation Services
DWSP	Drinking Water Supply Protection Grant Program
DLTA	District Local Technical Assistance program
EEA	Executive Office of Energy and Environmental Affairs
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FRCOG	Franklin Regional Council of Governments
LAND	Local Acquisitions for Natural Diversity
LWCF	Land and Water Conservation Fund
MassTrails	DCR funding for trail systems and trail experiences
MVP	Municipal Vulnerability Preparedness program
OSRP	Open Space and Recreation Plan
PARC	Parkland Acquisitions and Renovations for Communities Grant Program
s.319	Grants funded through section 319 of the federal Clean Water Act and administered by MassDEP

[1] Massachusetts Community One Stop for Growth online grant portal: https://www.mass.gov/guides/community-one-stop-for-growth

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE PLAN SHARING ACTION ITEM	POTENTIAL FUNDING SOURCES
GOAL A. PROTECT SHUTESBURY'S NATURAL RESOURCES — CLEAN AIR, CLEAN WATER, LARGE FOREST BLOCKS				
A.1 Prioritize the protection of lands that contain and support the function of natural, recreational, and cultural resources in Shutesbury.	Continue to work with adjacent towns, local land trusts, the state, and willing property owners to permanently protect parcels identified as having high conservation value following the criteria developed in the above action.	**Select Board,** Open Space Committee, Conservation Commission, Planning Board	Ongoing 2012 OSRP	Volunteer time, MVP Action Grant, Kestrel Land Trust
	Use the Criteria for Open Space Protection (*Section 5.F Criteria for Open Space Protection*), available land conservation tools, the technical support of UMass Extension, GIS data and analysis, 2021 OSRP Survey results, and other available conservation tools to develop criteria the Town can use to identify priority areas to conserve when exercising its Right-of-First-Refusal for land coming out of Chapter 61.	**Open Space Committee**, Conservation Commission, Planning Board, Select Board, Community Preservation Committee	Year 2	Volunteer time, DLTA, LAND, MVP Action Grant
	Research deeds of land owned by the Town Amherst Water Supply District (Table 5-12) to determine level of protection. If needed, identify if there is a path toward permanently protecting properties.			
A.2 Use Shutesbury's land use regulations to increase protection of valued natural and cultural resources, and to support climate change mitigation and adaptation strategies.	Continue to review and update land use regulations, the development review process, and general Town bylaws and policies for best practices to support green infrastructure,[2] low-impact development, environmental protection, and additional climate resiliency provisions.	**Planning Board**, Conservation Commission	Ongoing HMP, MVP - High	MVP Action Grant, EEA Planning Assistance Grant, DLTA, s.319
	Revive the proper protocol for notifying relevant Town bodies of a property sale subject to Chapter 61 Right-of-First-Refusal.	**Select Board,** **Town Assessor,** Planning Board, Conservation Commission	Year 1	Town funds
	Consider revising Zoning and Subdivision Regulations to improve performance standards for capturing stormwater runoff flowing from impervious surfaces in the Lake Wyola District.	**Planning Board**, Lake Wyola Advisory Committee	Year 1	MVP Action Grant, EEA Planning Assistance Grant, DLTA, s.319
A.3 Protect the availability and quality of drinking water resources.	Continue to educate owners of private septic systems about the importance of having systems pumped out and keeping them in good working condition in order to prevent risks to public health and the environment from systems that become overwhelmed during periods of heavy precipitation.	**Board of Health**, Select Board	Ongoing/ Year 3	Town funds, Volunteer time

[2] A variety of management practices that capture, filter, and reduce stormwater, primarily using vegetation and other natural systems. Green infrastructure is different from grey infrastructure, which uses structures such as curbs, pipes, stormwater drains, sewer, and water treatment plants to handle stormwater.

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE PLAN SHARING ACTION ITEM	POTENTIAL FUNDING SOURCES
	Continue to educate homeowners about the risk of well contamination and proper disposal of household waste, keeping them informed of water testing programs.		HMP, MVP - Moderate	
	Hire a consultant to conduct a feasibility assessment, including bedrock mapping, for a municipal water supply that would rely on multiple supply sources and relieve some of the need for private wells at every residence. Assess which areas in town would most benefit from a municipal water supply. Use the findings of the bedrock mapping study to inform the protection of important aquifer areas.	**Water Resources Committee**, Select Board	Year 5 HMP, MVP - Moderate	MVP Action Grant
A.4 Sustainably manage stormwater to reduce harm from polluted and erosive runoff to ground water, surface waters, and public and private infrastructure.	Hire a consultant to complete an assessment of all culverts in town. Include an evaluation of the physical state of the culverts and GIS data recording location. Based on the results of the inventory, prioritize repairs and replacements. Maintain an inventory of culvert and bridge needed and completed upgrades.	**Highway Department**, Select Board	Year 1 MVP - High	FRCOG, 3C, MVP Action Grant, DLTA
	Incorporate stormwater BMPs for rural dirt roads into public roadway projects following the forthcoming (2023) Dirt Roads Toolkit best practices manual created by the FRCOG. Assess opportunities to reduce runoff flowing from private driveways into roadways, including by encouraging stormwater BMPs at private residences.	**Highway Department**	Year 2 MVP - High	MVP Action Grant, FEMA Building Resilient Infrastructure and Communities Grant
	Explore funding options for private road maintenance for the Lake Wyola area.	**Lake Wyola Advisory Committee**	Year 2 MVP - Moderate	Volunteer time
	Hire a consultant to develop a plan for managing stormwater around Lake Wyola. Together with the *Locks Pond Road and Lake Wyola Subwatershed Stormwater Improvement Study*, use the plan to identify and implement high-priority practices to reduce runoff and sedimentation. Explore potential funding sources for top projects.	**Select Board**, Lake Wyola Advisory Committee	Year 1 - 3 MVP - High	s.319, MVP Action Grant, FEMA Building Resilient Infrastructure and Communities Grant
A.5 Manage ecosystems for their many benefits, including biodiversity, habitat, stormwater management, climate resilience, and carbon sequestration.	Work with Highway Department to implement best management practices for a) protecting pollinators and pollinator habitat, b) managing stormwater runoff from roads and municipal properties, and c) reducing the rate of spread of invasive species.	**Open Space Committee,** Highway Department	Year 2	Volunteer time, MVP Action Grant, EEA Planning Assistance Grant
	Conduct a public awareness campaign for residents on protecting and enhancing pollinator habitat.	**Open Space Committee**	Year 3	Volunteer time, DLTA MVP Action Grant, EEA Planning Assistance Grant

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE PLAN SHARING ACTION ITEM	POTENTIAL FUNDING SOURCES
	Develop a comprehensive public tree and forests management plan to identify, remove, and replace problem trees, preserve intact forests and street tree cover, and provide guidance and resources for gradually moving toward more climate-resilient trees and forest communities (e.g., species that will tolerate warmer temperatures).	**Select Board,** Town Tree Warden	Year 3 HMP, MVP - Moderate	MVP Action Grant, DLTA
	Hire a consultant to develop a comprehensive invasive species management plan including inventory, prioritization, and management options to address existing invasive populations that threaten important habitat and valued recreation spaces.	**Select Board,** **Open Space Committee**	Year 4 MVP - moderate	EQIP, MVP Action Grant
A.6 Protect scenic and historic landscapes and structures.	Familiarize all appropriate Town committees, boards, and property owners about efforts to protect and preserve historically significant Indigenous and Euroamerican cultural resources in Shutesbury. Ensure that Town-owned Indigenous and Euroamerican cultural resources are handled in a manner that is sensitive to and respectful of the need to preserve these cultural resources.	**Historic Commission**	Year 1	Volunteer time
	Submit an application to National Register of Historic Places (NRHP) for Historic Districts in Shutesbury	**Historic Commission**	Year 2	Volunteer time, CPA
	Assess whether there are roads in Shutesbury for which a scenic roads overlay zoning district could be an appropriate measure to protect historic stone walls and trees.	**Historic Commission**, Open Space Committee, Planning Board, Conservation Commission	Year 2 2012 OSRP	Volunteer time
	Conduct a landscape inventory to identify landscapes, vistas, stone walls, cellar holes, mill works, stone structures, etc. and prioritize for protection.	**Historic Commission**, Conservation Commission Select Board, Open Space Committee, Planning Board	Year 3	CPA
	Update the inventory of historically significant structures and properties in Shutesbury.	**Historic Commission**	Year 4	Volunteer time, CPA

GOAL B. BUILD AND ENHANCE COMMUNITY IN SHUTESBURY				
B.1 Preserve and enhance public community gathering spaces.	Support the growth and development of the Shutesbury Community Garden's size, infrastructure, and programming.	**Recreation Committee**, Open Space Committee	Ongoing 2012 OSRP	CPA, volunteer time, LWCF
	Support the Town's efforts to fund and construct a new library with indoor community space for public use as well as outdoor trails and gardens.	**Select Board, Library Board of Trustees,** Open Space Committee	Year 1	Volunteer time, PARC
	Obtain a grant to purchase playground equipment for children under 10. Consider the future library as a location for a playground.	**Recreation Committee,** Select Board, Open Space Committee	When library location is finalized	PARC, CPA, LWCF
B.2 Improve trails and trail systems, ensuring useful trail connections, improving public access, and establishing universal accessibility.	Sponsor public walks, hikes, and/or workshops where residents of all ages can learn more about public access trails and the natural history of Shutesbury.	**Open Space Committee, Recreation Committee**	Ongoing 2012 OSRP	Volunteer time, Shutesbury Cultural Council
	Create and maintain a central information site for public trails, recreation and conservation areas, and scenic and historic places of interest. Include resources for private landowners to learn about land protection and sustainable land management.	**Open Space Committee**, Recreation Committee	Ongoing 2012 OSRP	Volunteer time
	Develop a formal plan for trail access, development, and maintenance. Consider hosting a "Trails Summit" to convene stakeholders and identify needs and priorities.	**Open Space Committee Recreation Committee**	Year 2	Volunteer time
	Organize a dedicated group of volunteers to maintain the Town-owned South Brook Conservation Area.	**Open Space Committee**, Conservation Commission	Year 3	Volunteer time

GOAL C. ENHANCE RECREATION OPPORTUNITIES IN SHUTESBURY				
C.1 Provide recreation options for residents of all ages and abilities.	Implement the recommendations of the 2021 Shutesbury ADA Self-Evaluation and Transition Plan (*Appendix C*) to improve handicap access at Town-owned property.	**Select Board,** Recreation Committee, Open Space Committee	Year 2	MA ADA Improvement grant
	Obtain funding for and create a public trail with access for persons with disabilities. Consider the South Brook Conservation Area for this purpose.	**Open Space Committee** Recreation Committee, Select Board	Year 2 ——— 2012 OSRP	MassTrails, CPA MA ADA Improvement grant, LWCF
	Explore the possibility of improving existing infrastructure for recreational opportunities for teenagers (e.g., elementary school field for soccer, ultimate frisbee, and other team sports; volleyball court and baseball diamond behind the Fire Station).	**Open Space Committee,** **Recreation Committee**	Year 3	CPA, PARC, LWCF
C.2 Enhance water-based recreation options for residents.	Establish an area on Town-owned land suitable for stowing personal kayaks or canoes at Lake Wyola (in which the owner is responsible for securing their property).	**Open Space Committee**, Conservation Commission, Select Board	Year 3 ——— 2012 OSRP	CPA, LWCF
C.3 Improve pedestrian access and safety.	Enhance "walkability" in town through the creation of walking paths to popular destinations. Seek funds for the creation of a Complete Streets Prioritization Plan or other means to assess the need for sidewalk construction and/or wider shoulders to accommodate pedestrians and bikers in town.	**Select Board**, Planning Board, Highway Department	Year 4 ——— MVP - Moderate	3C grant, Complete Streets
GOAL D. CREATE THE ORGANIZATIONAL FRAMEWORK FOR ACHIEVING GOALS OF THE OPEN SPACE & RECREATION PLAN				
D.1 Follow through with the action items identified in this 2022 Shutesbury Open Space and Recreation Action Plan.	Provide for the implementation of this plan by ensuring that the Open Space Committee and Recreation Committee continue to be populated by members committed to attending meetings and carrying out the committee's responsibilities.	**Open Space Committee,** **Select Board,** **Recreation Committee**	Year 1 ——— 2012 OSRP	Volunteer time
D.2 Improve public awareness among Town departments and residents of environmental issues, natural resource protection, climate change, open space, recreation, and multi-use trails through effective systems of communication.	Outline a timeline for creation of public awareness campaigns for residents on topics such as pollinators, climate change, stormwater management, proper septic management, invasive plant management, and other public awareness needs identified in this plan.	**Open Space Committee**	Year 1	Volunteer time
	Establish annual Select Board updates from Town departments and committees regarding the impact of climate change on the town (including Lake Wyola), as well as their activities toward climate adaptation and mitigation. Updates to be reported at Annual Town Meeting and included in Annual Town Report.	**Select Board**	Year 2 ——— MVP - Moderate	Volunteer time

SECTION 10

PUBLIC COMMENT

Public feedback was sought throughout the entire open space and recreation planning process. The text and maps included in the plan reflect these enhancements. A direct request for feedback on the maps and 5-Year Action Plan was made at the virtual Public Forum held on December 16, 2021 via Zoom. XX people attended the forum. A lively discussion followed a 25-minute presentation introducing the plan. Comments from the forum participants were recorded by staff from the Franklin Regional Council of Governments.

One week previous and one week following the forum (December 9th thru 23rd, 2021), draft copies of the maps and all sections were made available for review on the Town of Shutesbury website. Comments received during the forum and the review period after the forum have been incorporated into the plan and are summarized below.

Copies of the public draft version of the Shutesbury Open Space and Recreation Plan were sent to the following boards and organizations for review and comment:

- Assessor
- Board of Health
- Community Preservation Committee
- Conservation Commission
- Highway Department
- Historical Commission
- Library Trustees and Library Director
- Lake Wyola Advisory Committee
- Planning Board
- Recreation Committee
- Select Board and Administrative Secretary
- Town Administrator
- Tree Warden
- Water Resources Committee

Final draft version of the Shutesbury Open Space and Recreation Plan were sent to the following boards and organizations for review and comment:

- Massachusetts Division of Conservation Services (DCS)
- Shutesbury Selectboard
- Shutesbury Planning Board
- Shutesbury Conservation Commission
- Shutesbury Recreation Committee

Letters of comment are included at the end of this section. The letters reflect a broad base of support for the research, analysis, outreach, and recommendations developed by the Shutesbury Open Space Committee.

Forum Discussion Topic 1: How

Comments:

- XX
- XX

Forum Discussion Topic 2: How

Comments:

- XX
- XX

Comments received after the forum were addressed or incorporated unless otherwise noted. Where the comment was not applied in full, an explanation is given in italics.

Section 1 – 8 Comments

Comment:

Section 9 comments

Comment:

SECTION 11

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APPENDIX A

SECTION 4 SUPPLEMENTAL INFORMATION

Soils

Soils in Shutesbury owe their characteristics to the glacial deposits from which they were derived. The soil analysis provided here is based on the 1967 survey by the Soil Conservation Service, although a more recent soil survey has been published and is available online.[1] Most soils in Shutesbury are shallow-to-bedrock, contain stones, and either are poorly-permeable or saturated, or are highly permeable, yet contain a nearly-impermeable, fragipan layer close to the surface. All of these characteristics make them less-than-ideal candidates for housing uses (including standard septic system installations), and better suited for forests, pasture, and, in some cases, crop land (Map 4C). The Natural Resources Conservation Service (NRCS) has classified all but 143 acres or 0.8 percent of the land in Shutesbury as containing soils having severe limitations for building, including the construction of septic system absorption fields. Excessively-slow or excessively-fast percolation rates, steep slopes, shallow depths to bedrock, the presence of abundant stones and shallow depths to the water table are the reasons for the NRCS classification of "severe limitation". While, in most cases, these problems can be overcome by constructing raised-bed or oversized leach fields, the need for these measures may limit the extent of future development in town.

NRCS has classified approximately 1,838 acres or 10.5 percent of the land in Shutesbury as having Prime Farmland Soils,[2] on the basis of having optimum drainage, permeability and moisture-holding capacity, temperature, length of growing season, slope, and pH; acceptable salt and sodium content, and a minimal number of stones. Prime Farmland Soils have the best combination of physical and chemical characteristics for producing an economically-sustained, high yield of food, feed, forage, fiber and oilseed crops when managed according to acceptable farming methods, including water management. In Shutesbury, these are generally Merrimac, Sudbury, and Scituate soils. An additional 4,203 acres, or 24 percent of the land is classified as having Farmland Soils of State and Local Importance, due to their possession of most, but not all, of the same characteristics as the Prime Farmland Soils. For example, these latter soils often contain a greater number of stones or lie on terrain having greater slopes. 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.

[1] https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

[2] MA GIS Prime Farmland Soils datalayer, 2020.

The Commonwealth has also mapped Prime Forestland based on soil productivity and wetness characteristics. Potentially forested land was classified into nine categories established by the U.S. Department of Agriculture: Prime I, II and III, Prime III wet, Statewide Importance and Statewide Importance wet, Local Importance and Local Importance wet, and Unique. Aspect, land cover, slope and hydrology were also considered in the mapping. The top three categories of productive forest land were called Prime I, II and III. Prime I, II, and III Forestland Soils occupy 14,603 acres or 84 percent or the total land area in Shutesbury and support production of white pine wood fiber at a rate greater than 85 cubic feet per acre per year, and northern red oak wood fiber at a rate greater than 40 cubic feet per acre per year.[3] These soils are important for commercial forest management. Prime I and II Forestland Soils are found in both the Connecticut River and Chicopee River Watersheds, though Prime I soils are notably absent from the southern quarter of town and both are absent from the southeast corner of town. Prime III Forestland Soils are found throughout town. Prime I Forestland Soils are comprised mainly of Ridgebury Soils and cover 3411 acres or 19.6 percent of the land in Shutesbury. Prime II Forestland Soils cover 4,041 acres or 23.2 percent or the land surface and are composed of Gloucester, Sudbury and Merrimac soils.

The primary soil association in town is the **Shapleigh-Gloucester-Essex Association**. These soils are widely distributed and occur at elevations ranging from 500 to 1,200 feet on forested, rolling, stony and rocky hills. They are shallow to deep, well-drained soils that formed in the sandy, stony glacial till of the uplands. These droughty, rocky, low-fertility soils are more suitable to forestry uses than to farming. In Shutesbury, this soil association is represented by Shapleigh, Essex, Gloucester, Scituate, and Ridgebury soils.

Shapleigh Soils are widely distributed throughout town and are found on the tops of the major, higher elevation ridges and hills, including Morse Hill, Ames Hill, Mount Mineral, Beech Hill, and in the January Hills. They are also found in certain areas along Atherton Brook, Nurse Brook, Osgood Brook and Town Farm Brook. Shapleigh Soils are shallow, excessively drained to somewhat excessively drained soils occurring on steeper slopes (15 to 60 percent) that contain many rocky ledges or outcrops and where the depth to bedrock is generally less than 2 feet. These soils are fine sandy loams that are moderately to rapidly permeable, but have low moisture-holding capacity due to their shallowness. They are also low in organic content, extremely- to moderately-acidic and subject to erosion. Due to their droughty nature, these soils are not good for agricultural uses and are mostly covered with forest or pasture. These soils are also poor for siting septic systems and for constructing building foundations, due to the shallow depths to bedrock and the steep slopes.

Essex Soils are widely distributed throughout the eastern two-thirds of town. They are found on the side and lower slopes of the steeper, higher-elevation ridges and hills, and in some of the flatter lowlands between hills, including the areas in the northeastern corner of town, east of West Pelham Road, east and west of Wendell Road, east of Town Farm Brook, along Rocky Run, and southwest and northeast of Lake Wyola. These are deep, well-drained, sandy loams and loamy sands containing some stones and boulders that occur on slopes ranging from 15

[3] Town of Shutesbury. Shutesbury Open Space and Recreation Plan, 2012

to 45 percent. Although these soils are moderately-to rapidly-permeable and have a high moisture-holding capacity, they also have a compact, fragipan layer at 1.5 to 2.5 feet which restricts root growth and the vertical movement of water due to its low permeability. The fragipan layer also has a low-moisture-holding capacity. Bedrock in these areas ranges from depths of only 3 feet to up to 20 feet, but high groundwater is relatively shallow, existing at depths of 3 to 5 feet below the surface. These soils have a very low organic content and are strongly- to slightly-acidic. They are good for the following uses: forest, pasture, dairy farming and orchards. However, if these soils are under cultivation, erosion control measures need to be put in place. The presence of the fragipan layer and the steep slopes on which these soils often occur make them poor for siting septic systems and building foundations.

Gloucester Soils occur on slopes ranging from 8 to 25 percent and are found on the upper slopes of some of the major ridges and hills in town, such as in the January Hills area, on Poverty Mountain, in The Plains, in the area along the Leverett border extending from The Plains north past the Dudleyville Marsh, around Atkins Reservoir, in the area southeast of Mount Mineral, in an area straddling the intersection of Locks Pond Road and Wendell Road, and along Pelham Hill, West Pelham and Baker Roads. These soils are well-drained to excessively well-drained, fine sandy loams underlain by loamy sands that contain many stones and boulders. The substratum of these soils is often firm to very firm at depths ranging from 2.5 to 5 feet. They have slow to moderately-slow permeability and low organic content and are extremely to moderately acidic. Bedrock lies at depths of 3 to 20 feet and high groundwater ranges in depth from 3 to 5 feet below the surface. These soils can be used to grow row crops and forage crops and for orchards, but are droughty, so irrigation is required. These soils also can be subject to erosion when under cultivation. The stoniness of these soils and the steeper slopes on which they occur make these soils poorly suited for the construction of septic systems and building foundations.

Scituate Soils are found on some of the lower slopes of ridges, in some river valleys and in some of the flatter areas between rolling hills in town, including The Plains, the area between Montague and Locks Pond Roads, and areas along Nurse Brook, Roaring Brook, Baker Brook, Dean Brook, Town Farm Brook, Atherton Brook, Adams Brook, and Osgood Brook. These well-drained, deep, fine sandy loams occur on 3 to 15 percent slopes. A fragipan layer exists at 1.5 to 2.5 feet. Above the fragipan layer, the soil is moderately to rapidly permeable and has a high to moderate moisture-holding capacity. Scituate soils are strongly to moderately acidic. Bedrock in these areas ranges in depth from 3 to 20 feet below the ground surface and high groundwater is very shallow, at a depth of 1.5 feet. Due to the high water table and the presence of the fragipan layer, these soils remain saturated until late spring, hence, drainage is required in order to grow corn, silage, and hay or to use areas underlain by Scituate soils for pasture. Under cultivation, erosion controls are necessary and stones must also be removed to make the soils suitable for planting crops. These soils are also suitable for forest uses, however, they are not suitable for the construction of septic systems or building foundations, due to the presence of the high water table, fragipan layer and steeper slopes.

Ridgebury Soils are found along the valley floors and at the headwaters and tributaries of Dean Brook, Nurse Brook, Baker Brook, Roaring Brook, Rocky Run, Town Farm Brook, Cobb Brook and Osgood Brook. Ridgebury soils are also found in a north-south strip lying

east of Dudleyville Marsh and Morse Hill, along Tyler Brook and along the portion of the West Branch of the Swift River that lies north of Mount Mineral Road. Ridgebury Soils are poorly drained, deep, fine sandy loams. These soils are strongly to moderately acidic, have moderate to high organic content and contain stones and boulders. Soils closer to the surface are moderately to rapidly-permeable and have a high moisture-holding capacity, but a fragipan layer is present at depths of 1 to 2.5 feet. High groundwater is present at or very near the surface, to a maximum depth of 1 foot, so these soils remain saturated for 7 to 9 months of the year. Bedrock ranges in depth from 3 to 20 feet. These soils are not suited to the construction of septic systems or building foundations, due to the shallow groundwater and the presence of the fragipan layer, but may be used to grow silage or hay, if drainage is provided. These soils also support the growth of forests.

The **Hinckley-Merrimac Association soils** are much less abundant than the Shapleigh-Gloucester-Essex Association soils and occur at elevations ranging from 500 to 700 feet. These soils are droughty to somewhat droughty, sandy and gravelly soils that are found on nearly level to gently sloping terrain. These soils formed on outwash plains and on stream terraces in deep deposits of sand and gravel and are most suitable for housing, forestry, dairy farms and truck farms. This soil association is represented by Hinckley, Merrimac and Sudbury Soils. The related Hinckley-Windsor-Merrimac Association is represented by Hinckley, Merrimac, Carver, Walpole and Wareham, Windsor, and Scarboro soils in Shutesbury. These latter soils occur at elevations ranging from 130 to 350 feet on terraces separated by short, steep escarpments. These soils are droughty and somewhat sandy and have formed in deep, sandy and gravelly deposits, such as those deposited by glacial meltwater streams. These latter soils are most suitable for housing and agriculture.

Hinckley Soils are found mainly in the upper and lower portions of valleys in the northwestern, eastern, west-central, and southwestern sections of town. These soils are found along Tyler Brook, Roaring Brook, Dean Brook, the upper portion of the West Branch of the Swift River east of Beech Hill, the lower one-third of the West Branch of the Swift River and a portion of its main tributary, the upper portion of Osgood Brook, and the lower portion of Atherton Brook. Hinckley soils are also found around the eastern, southern, and western edges of Ames Pond; along the western and eastern edges and northeast of Lake Wyola; north of Atkins Reservoir; west of Wendell Road at Carver Road; and along the western shore of Quabbin. They are excessively-drained, coarse-textured, sandy and gravelly, sandy loams that occur on slopes ranging from 3 to 35 percent. They are rapidly permeable, have a low moisture-holding capacity and are moderately-to very strongly acidic. A gravelly, cobbly substratum is present at depths of 1 to 1.5 feet, bedrock is present at depths greater than 10 feet, and high groundwater is present at depths from 3 to 5 feet below the surface. These soils support forests that provide good wildlife habitat and are also well suited to building foundation and septic system construction if the slopes are not too great. However, irrigation and erosion controls are needed to grow crops or hay, or for use as pasture land. Merrimac soils are limited in distribution in Shutesbury. The largest acreage of Merrimac soils is found along the West Branch of the Swift River and its major tributary in the northeastern one-third of town. Merrimac soils are also found south and northeast of Atkins Reservoir, along the portion of Dean Brook that is located east of Pratt Corner, and in the area between Ames Pond and the Footit Bog. These soils are fine sandy loams or sandy loams that are found on slopes ranging from 3 to 15 percent. They are excessively well-drained, moderately to

rapidly permeable, and extremely to moderately acidic. These soils have low moisture-holding capacity and a low organic content. A coarse sand or gravel layer is present at depths ranging from 1.5 to 3 feet, bedrock is present at depths greater than 10 feet, and high groundwater is present at depths from 3 to 5 feet or more below the ground surface. These soils are usually good for housing and septic system uses and good for intensive farming of tobacco, corn, forage, alfalfa and truck crops.

Sudbury Soils are found only on nearly-level terraces near fast-flowing streams along the West Branch of the Swift River, Roaring Brook, Adams Brook, Dean Brook, the Sawmill River, South Brook, and at the northwestern edge of Lake Wyola. These soils are moderately well-drained, fine sandy loams that are underlain by gravel and cobbles at depths of 2 feet. Bedrock is found at depths greater than 10 feet and high groundwater is 1.5 to 2 feet below the surface in winter and early spring. The seasonal shallow groundwater table makes these soils poor locations for the construction of septic systems and building foundations, and drainage is needed for growing row crops. However, these soils are well suited for growing hay or as pasture, without any drainage requirements.

Carver Soils are found on 3 to 25 percent slopes in isolated patches along valleys and in lowlands in the following areas: north of Atkins Reservoir, northwest and west of Lake Wyola, southwest of Mount Mineral, and along Dean Brook, Roaring Brook and Baker Brook. These soils are excessively drained, loamy coarse sands that are underlain by coarse sands at depths of 1.5 to 2 feet. They are rapidly permeable, have a low moisture-holding capacity and are moderately to strongly acidic. Plant nutrients leach rapidly and organic matter is quickly depleted from these soils and they are subject to wind and water erosion, when present on unprotected slopes. Bedrock is found at a depth of 20 feet and high groundwater is found at depths greater than 5 feet. On steeper slopes, these soils are poorly suited to the construction of septic systems and building foundations. Irrigation is needed to grow truck crops, tobacco, corn and alfalfa. These soils support forests that provide good wildlife habitat, but few trees of commercial value grow naturally on them.

Walpole and **Wareham Soils** are very limited and scattered in distribution in Shutesbury. These soils are found in the low-lying areas north and west of Atkins Reservoir, on the Leverett border south of Roaring Brook, along Roaring Brook west of the intersection of Montague Road and Leverett Road, along Dean Brook just east of Pratt Corner, in the area between the northeastern corner of Lake Wyola and the northwestern end of Ames Hill, and along a portion of the main tributary to the West Branch of the Swift River that lies north of the border with New Salem. These soils are deep, poorly drained, fine sandy loams that formed in depressions or gently-sloping areas on glacial outwash or stream terraces. They are underlain by silt, clay, sand or sand and gravel at depths of 1.25 to 3 feet. They are moderately to rapidly permeable, have a moderate to high moisture-holding capacity, have a moderate organic content and are strongly to slightly acidic. Bedrock is found at depths greater than 10 feet and groundwater is found at or near the surface (to a depth of 1 foot) for 7 to 9 months of the year. Because they are so poorly drained, these soils are unsuitable for the construction of septic systems or building foundations or for growing row crops. However, they are good for growing hay and for pasture land and support the growth of forests.

Windsor Soils are found in just one area of town in the lowlands between Mount Mineral and Ames Pond. These soils are excessively-drained, droughty, loamy fine sands that consist of 2 feet of loamy fine sand over sand. Gravel may be present at depths of 4 to 5 feet. Bedrock lies at depths of more than 10 feet and high groundwater lies between 3 and 5 feet below the surface. These soils are rapidly-permeable and have a low moisture-holding capacity, so they require irrigation and the addition of fertilizer and lime for growing truck crops, tobacco, corn and alfalfa. They also support forest and provide wildlife habitat. Windsor soils are also suitable for the construction of septic systems and building foundations.

Scarboro Soils are found in only a few, small, low-lying areas north and southeast of Atkins Reservoir, and northwest and southeast of Lake Wyola. These soils are rapidly-permeable, but very poorly-drained, fine sandy loams that have formed in glaciofluvial plains and terraces or in low, flat areas. They consist of 1 foot of sandy loam or fine sandy loam underlain by 1 foot of sand to sandy loam, which is, in turn, underlain by sand and gravel. Bedrock is present in these areas at depths exceeding 10 feet. The high water table is at the surface for most of the year, making these soils unsuited to the construction of septic systems or building foundations. If drainage is provided, Scarboro soils may be used for pasture or growing hay, however, fertilizer and lime must be added. In the absence of drainage, these soils will support forest and limited grazing, and provide wildlife habitat.

There are also a few other types of soils found in very limited distribution and abundance in town. Muck soils are found at and northeast of the Footit Bog, and at the headwaters of Tyler Brook, Rocky Run, and Roaring Brook. Peat soils, indicative of acidic bog conditions, are found in the following areas: south of Baker Reservoir, between Atherton Brook and Cobb Brook in the southeastern corner of town, at the southern end and northeast of Dudleyville Marsh, at the southeastern edge of Lake Wyola, at the northeastern edge of Ames Pond, and at the headwaters of Osgood Brook, Camel Brook, and the West Branch of the Swift River. In addition, a single small area of Agawam soils is found north of Dudleyville Marsh, and the Adams Brook Valley contains small areas of Ondawa, Podunk and Rumney soils. All of these soils are fine, sandy loams.

Connecticut River and Chicopee River Watersheds

Connecticut River Watershed

Adams Brook Sub-watershed

The Adams Brook Sub-watershed is located south of Leverett Road and west of Pelham Hill Road and covers 3,721 acres or 21 percent of town. Adams Brook, Dean Brook and Nurse Brook are the three main tributaries. Many forested and non-forested wetlands are located at the headwaters to these brooks. Baker Brook is tributary to Dean Brook and feeds into Baker Reservoir, a 2.7-acre man-made pond that was created in the 1890s and is located on the southern side of Baker Road. It has an associated 22-acre wetland, consisting of both forested and non-forested areas (covering approximately 21 acres and 1.3 acres, respectively). Old records describe some unusual wetland plants inhabiting the southern

shore, such as wild calla, closed gentian, swamp azalea, rhodora, round-leaved sundew, and black tupelo. Nurse Brook feeds into Atkins Reservoir, a 48-acre water body that is located in the southeastern corner of Shutesbury along Cushman Road. The site of the former Atkins Pond, the reservoir was developed in the 1930s as a surface water drinking water supply for the Town of Amherst. The reservoir has a watershed of approximately 6 square miles, a surface area of 51 acres, a storage capacity of 200 million gallons, and an estimated safe yield of 1.2 million gallons. The reservoir provides a pristine and scenic vista from the January Hills area.

Since it is a public water supply, the reservoir is theoretically off-limits to recreational uses. According to the 2017 Amherst Draft Open Space and Recreation Plan, watershed lands owned by the Town of Amherst "are considered restricted open space and allow only informal passive or traditional consumptive forms of recreation such as walking, bird watching and hunting that do not threaten the integrity of the water resource. The Town of Amherst prevents trails from developing on protected watershed lands by restricting access with perimeter "No Trespassing" signs, gated entries along access roads, partnerships with the local Police Departments, and frequent windshield inspections with semiannual site visits." According to the same source, despite these precautions, infrequent use by trespassers continues to be an issue.

Dean Brook flows into Adams Brook southeast of Atkins Reservoir, but the Town of Amherst sometimes diverts water from Dean Brook into Atkins Reservoir. Dean Brook has one of the most scenic cascade and gorge landscapes in the area. In the spring, MassWildlife stocks Adams Brook with brook trout and also with rainbow trout, when available. In the past, Dean Brook has contained a population of native brook trout.

Sawmill River Sub-watershed

The Sawmill River Sub-watershed occupies 2,655 acres or 15 percent of Shutesbury and is located in the northwestern corner of town, around Locks Pond Road, Lakeview Road and the northern ends of Wendell and Montague Roads.

Ames Pond

Ames Pond is a 22-acre man-made water body with a stone dam that was used to power a mill in the late nineteenth century. The pond is only 5 feet deep at its deepest point. Ames Pond is located east of Lake Wyola and is fully encompassed by the Julian's Bower property owned by Kestrel Land Trust. A 35-acre wetland extends northeast from the pond's eastern shore and contains 19.5 acres of forested wetland and 15.5 acres of non-forested wetland, including a spectacular 2-acre natural bog, located directly along the shoreline. The bog contains cotton grass, wild cranberry, swamp pink, leatherleaf, button bush and round-leaved sundew (a carnivorous plant). The Pond contains a beaver lodge and is used by a variety of wildlife. Water from an adjacent freshwater marsh drains into Ames Pond and the flow of water out of the marsh has been periodically restricted by beaver dams. In 2021, the property was acquired by Kestrel Land Trust so that it may be available for public use. A trail system around the property may be used by the public for permitted uses that are posted. Ames Pond drains into South Brook which flows into Lake Wyola.

Lake Wyola

Lake Wyola is used intensively for fishing, swimming, boating and water skiing in the summer and for ice fishing and snowmobiling in the winter. DCR manages the 40-acre Lake Wyola State Park Carroll A. Holmes Recreation Area that is located on the northern shore of the lake. The park has a beach, trails, and picnic areas. At the southern end of the lake, near the boat ramp, both non-forested and forested wetlands exist on town conservation land that has trails connecting to the South Brook Conservation Area.

The lake is considered a warm-water fishery, although trout — a cold-water fish — can survive in approximately 10 percent of the lake. Chain pickerel, brown trout, rainbow trout, yellow perch, sunfish (including pumpkinseed, blue gill, and black crappie), brown bullhead, golden shiner, banded killifish, fallfish, and white sucker are found in the lake. These species include both native and non-native species. The peak fishing season is from April through June, however, ice fishing for chain pickerel and trout is also popular. MassWildlife stocks the lake with brook trout and rainbow trout in the spring and rainbow trout in the fall. The water quality of the lake is also crucial for the Sawmill River which flows out of the lake and contains a population of native brook trout.

Tyler Brook flows into Tyler Pond and subsequently into Plympton Brook in Wendell. Plympton Brook flows into Fiske Brook (in Wendell) which, in turn, flows into Lake Wyola and contributes approximately 80 percent of the water entering the lake. Just upstream of the location where Fiske Brook enters Lake Wyola, emergent and scrub-shrub wetland vegetation is present. South Brook drains into the southern end of the lake after flowing through an 8.7-acre forested wetland in the interior and a 7-acre non-forested wetland along the shoreline. The round-leaved sundew has been observed growing along the shoreline east of the boat launch, in the past. A 19-acre non-forested wetland, lies at the headwaters to South Brook, along with the adjacent 2-acre “Footit’s Bog”.

Lake Wyola is 129 acres in size and has a maximum depth of 33 feet, although most of the Lake is relatively shallow, with an average depth of only 11 feet. Lake Wyola, then known as Locks Pond, was a mill pond in the eighteenth and nineteenth centuries that supplied a series of mills in Leverett via its outflow stream, the Sawmill River. The current dam was built in 1888 and its creation approximately doubled the surface area of the original pond. The dam has both a spillway and a manually operated gate that allows the release of additional water during occasional drawdowns for dam maintenance and repair. In 1998, the Office of Dam Safety (part of what is now DCR) ordered a safety assessment of the dam to be performed and certain repairs to be undertaken to prevent downstream flooding and erosion in the event of a dam failure. The inspection was done immediately and repairs were completed in 1998. The dam inspection schedule is once every two years. Routine inspection led to repair work in fall 2008 and early winter 2009 during another drawdown. The 2016 inspection identified additional safety work needed on the dam that will take place during or after the completion of the Locks Pond culvert project (slated to be completed in the fall of 2021).

Town activity at Lake Wyola is managed by the Lake Wyola Advisory Committee. The purpose of the Lake Wyola Advisory Committee is to serve as a liaison between Town government and the lake community, and to promote the preservation, maintenance, and enhancement of the lake as a natural and recreational resource. Its purview includes protection

of water quality from septic systems and other sources of contamination, erosion and runoff control, and dam safety. Its functions include, but are not limited to, regular water quality assessment and oversight of the dam. The membership of the committee would ideally include one member each from the Select Board, Conservation Commission, Board of Health, and Planning Board; the Emergency Management Director and Dam Keeper; and no more than five members of the Lake Wyola Association.[4] The committee also oversees the annual drawdown — the process of lowering the lake level to protect the shoreline and structures on it from ice damage. As of 2019, the Lake Wyola Advisory Committee had a Wildlife Habitat Evaluation performed and instituted the practice of filing a Notice of Intent with the Conservation Commission.[5] Cooperation with the Conservation Commission results in a timeline for the lowering of the lake that allows wildlife to move to safety.

A Great Pond is defined as any pond or lake that contained more than 10 acres in its natural state. With an original size of 65 acres before the dam was constructed, Lake Wyola qualifies as a Great Pond. Public access is required and this is provided at the southern end of the lake where a public boat ramp exists off Randall Road. The lake's Great Pond status also mandates that certain projects in and around the lake, such as aquatic weed control, beach sand replenishment, dredging, the placement of fill, the lowering of water levels, and the construction of docks, piers, moorings, or rafts, are subject to not only the Massachusetts Wetlands Protection Act Regulations (WPA Regulations: 310 CMR 10.00), but also to the Waterways (Chapter 91) Regulations (310 CMR 9.00). In addition, the 401 Water Quality Certification Regulations (314 CMR 9.00) apply to projects involving dredging or filling.

Both invasive vegetation and algae thrive in the acidic conditions, such as those present in the lake, that derive from surrounding acidic soils, and this could be a potential major problem. In the past, the growth of algae and other aquatic vegetation in the lake was monitored by scuba divers who collected samples and conducted underwater video mapping and by visual observations during drawdowns and walks around the lake. More recently, federal grant money was used to fund an aquatic vegetation study by Geosyntec Consultants, Inc. In addition, volunteers from the Lake Wyola Association, who were trained by DCR staff, have been participating in a Weed Watchers Program to keep an eye on invasive weed growth in the lake. To date, Lake Wyola is currently free of invasive submergent aquatic vegetation, such as Eurasian milfoil, Brazilian waterweed, hydrilla, parrot feather, curly pondweed, and water chestnut, although Eurasian milfoil is present in the "Tri-lakes" region of Belchertown and in Leverett Pond.

Dudleyville Marsh

The former Dudleyville Ponds off the eastern and western sides of Montague Road were drained several years ago (by order of DCR's Office of Dam Safety) and have become the only large expanses of herbaceous wetland in town, outside of some areas of the DCR's Quabbin property. The former ponds now consist of 9.25 acres of shallow and deep marsh,

[4] Lake Wyola Advisory Committee Minutes of May 13, 2017 meeting, https://www.shutesbury.org/sites/default/files/minutes/lake-wyola-advisory-committee/170513lwacmin.pdf

[5] Town of Shutesbury. *Annual Report*, 2019

with a natural spring and sphagnum bog on the western side and 6 acres of forested wetland along the southern end of the marsh. Part of the wetland and bog on the western edge are protected as town conservation land. The private owner of the dam is considering removing the dam. Young white pine and some phragmites (an invasive species) are growing in along the shoreline, but the bog appears to be stable.

Roaring Brook Sub-watershed

The Roaring Brook Sub-watershed covers 2,914 acres or 17 percent of town. Most of its tributaries are located north of Leverett Road and the main stem runs parallel to Leverett Road where its steep gradient and forested banks provide one of the most scenic landscapes in town: the "S-curves." Both forested and non-forested wetlands and several small ponds are located within this watershed. In the past, MassWildlife has stocked Roaring Brook in the spring with brook and rainbow trout, when available. Roaring Brook has also contained a population of native brook trout in the past. Concerns about this area include the impacts of road drainage, road maintenance, and driveway crossings, and the potential decline of the hemlocks due to the hemlock wooly adelgid.

Chicopee River Watershed

Quabbin Reservoir is located on the eastern edge of Shutesbury. The reservoir occupies a total of 24,700 acres, however, only 138 of its acres and 2.7 miles of its shoreline are located within Shutesbury. The portion of the Quabbin Reservoir Watershed that is located in Shutesbury occupies 7,862 acres or approximately 45 percent of town. The DCR's Division of Water Supply Protection owns 5,098 of these acres, 4,147 of which are Off-Reservation Lands, with the remainder being the more highly restricted Quabbin Reservation Lands. Off-Reservation lands are areas managed by the DCR Division of Water Supply Protection outside the bounds of the Quabbin Reservation, which in Shutesbury is all land west of Route 202).

The Massachusetts Watershed Protection Act Regulations (313 CMR 11.00) control recreational uses on both Reservation and Off-Reservation lands. Canoeing, kayaking, boating, swimming, ice fishing, and ice skating are prohibited activities in Quabbin Reservoir, however, fishing for lake trout, brown trout, rainbow trout, brook trout, landlocked salmon, chain pickerel, largemouth bass, and smallmouth bass is allowed. Fishing within the Quabbin Reservoir and West Branch of the Swift River on the Reservation Lands is restricted to the period from mid-April through mid-October, whereas year-round fishing is allowed in the streams on Off-Reservation Lands.

MassDEP lists the Quabbin Reservoir as a category 4a impaired waterbody in the 2016 Integrated List of Waters.[6] A total maximum daily load (TMDL) has been established based on mercury contamination in fish tissue. The assessment also recognizes non-native aquatic plants (for which a TMDL is not required) as a threat to water quality.

[6] Massachusetts Department of Environmental Protection, "Massachusetts year 2016 Integrated List of Waters: Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act,"2016, https://www.mass.gov/files/documents/2020/01/07/16ilwplist.pdf

Rocky Run and Camel Brook drain into the West Branch of the Swift River in the north-central and east-central sections of town, respectively. Both brooks contain forested wetlands at their headwaters. A small pond is located at Rocky Run's headwaters. The West Branch of the Swift River contains both forested and non-forested wetlands at several locations throughout its length within Shutesbury. In the past, Rocky Run has contained a population of native brook trout.

Cobb Brook and Atherton Brook (and its tributaries Town Farm Brook and Osgood Brook), and Briggs Brook drain land in the extreme southeastern corner of town and empty into the Quabbin Reservoir. In the past, Atherton Brook has contained a population of native brook trout. Forested wetlands exist along Town Farm Brook and Osgood Brook. Osgood Brook and Briggs Brook have small ponds located at their headwaters. In addition, Osgood Brook drains a non-forested wetland.

The West Branch of the Swift River contains numerous forested wetlands and some non-forested wetlands. It also contains both a native brook trout population and a group of sensitive invertebrates that are indicative of high water quality and the absence of pollutants. The river is annually stocked with brook trout. The West Branch of the Swift River empties into Quabbin Reservoir. West Branch of the Swift River is a popular fly-fishing area in the fall. Rainbow and brown trout are also known to ascend the West Branch to spawn in the spring and fall, respectively.

Massachusetts Regulations Protecting Surface Water, Watershed Areas, and Wetlands

A number of state laws and regulations protect surface water, watershed areas, and wetlands in Massachusetts. These are the Massachusetts Surface Water Quality Standards (314 CMR 4.00), the 401 Water Quality Certification Regulations (314 CMR 9.00), the Massachusetts Drinking Water Regulations (310 CMR 22.00), the Watershed Protection Act Regulations (313 CMR 11.00), the Massachusetts Water Resources Management Program Regulations (310 CMR 36.00), and the Wetlands Protection Act Regulations (310 CMR 10.00). Since most of Shutesbury's streams are not considered navigable, the Waterways Regulations mainly apply to regulated activities within Lake Wyola, as already described. All perennial streams receive protection under the Rivers Protection Act of 1996, which requires a 200-foot Riverfront Area protective buffer.

Under the **Massachusetts Surface Water Quality Standards,** Class A Waters include sources of public water supplies and their tributaries; waters designated as excellent habitat for fish and other aquatic life for their reproduction, migration, growth, and other critical functions; and waters used for primary and secondary recreation (if allowed). Class A Waters are protected as Outstanding Resource Waters. Regulated Outstanding Resource Waters cover a considerable percentage of the town's land area (more than half the land area in a north-south direction) since the Quabbin Reservoir and its tributaries, the Town of Amherst's Atkins Reservoir and its tributaries, and Amethyst Brook are all classified as Outstanding Resource Waters. A **401 Water Quality Certification** must be obtained for any discharge of dredged or fill material to a water of the Commonwealth and these regulations set strict limits on alterations to Outstanding Resource Waters. Limits are placed on discharges to these waters that affect dissolved oxygen, temperature, pH, bacteria, solids, color and turbidity, oil and

grease and taste and odor. Additional limitations are also placed on discharges to these waters that may affect aesthetics, or concentrations of bottom pollutants, or alterations that affect the bottom, nutrients or radioactivity, or contribute toxic pollutants. Generally, discharges of fill or dredged materials to Outstanding Resource Areas are prohibited; no discharge of dredged or fill material is allowed in wetlands or waters of the Commonwealth within 400 feet of the high water mark of a Class A surface water (exclusive of its tributaries). However, some discharges are allowed under certain conditions when done by a public water system, by a public agency or authority for roadway maintenance or if the project has obtained a variance.

The **Massachusetts Drinking Water Regulations** regulate three surface water protection areas: Zones A, B, and C. The Zone A to a surface water contains land between the surface water source and the upper boundary of the bank, land within 400 feet of the bank of a Class A (public drinking water supply) surface water source, and land within 200 feet of the bank of a tributary or surface water body that lies upstream of a Class A surface water source. Zone B is land within 0.5 miles of the bank of a surface water source or the edge of the watershed, whichever is less, but always includes land within 400 feet of the bank of a Class A surface water source. Zone Cs are all land between the Zone B boundaries and the watershed boundaries in Shutesbury. Amethyst Brook and all tributaries to Quabbin and Atkins Reservoirs (all classified as Class A surface water sources) have associated Zone As, Bs, and Cs. However, the regulation of activities along certain tributaries in the Quabbin Reservoir watershed comes under the jurisdiction of the Watershed Protection Act (to be discussed in the following paragraph). The only sub-watershed in Shutesbury that is not covered is the Sawmill River Sub-watershed, with tributaries coming from Ames Pond, South Brook, Tyler Brook, Fiske Brook, Plympton Brook (both in Wendell) and the Dudleyville Marsh. In Zone As, where a water supplier is proposing to develop a new or expanded public surface water supply, the following new or expanded uses are prohibited: underground storage tanks; above-ground storage of liquid hazardous wastes (with some exceptions for fuel tanks for household use or tanks within containment structures, etc.); and certain wastewater treatment or disposal facilities. In addition, water suppliers are expected to show that they have made best efforts to put into place zoning and non-zoning controls to prohibit the siting of the following new land uses within a Zone A: facilities that generate, treat, store or dispose of hazardous wastes; sand and gravel mining operations; the uncovered or uncontained storage of fertilizers, manure or de-icing materials; junk and salvage operations; motor vehicle repair operations; cemeteries; solid waste combustion or handling facilities; commercial car washes; and land uses that render impervious more than 15 percent or 20 percent (with artificial recharge), or 2,500 square feet of any lot, whichever is greater. Additional restrictions apply to septic or sewer systems; the stabling, feeding or grazing of livestock; and burials in existing cemeteries within Zones A and B. Furthermore, swimming, bathing, wading, fishing, boating, ice-fishing and domestic animals are prohibited within any surface water source or tributary thereto. Public water suppliers are required to periodically inspect Zones A, B, and C to ensure compliance with the regulations and thereby protect surface water supplies. Since the Town of Amherst owns most of the watershed land associated with its various water supplies, ensuring compliance with the Drinking Water Regulations in most locations is easier than if these lands were in private ownership.

Under the Massachusetts Drinking Water Regulations, a Zone I protective radius must be established around each public water supply well that is either owned or controlled by the

supplier of water, so that current and future uses within this zone are limited to those directly related to the provision of drinking water that have no significant adverse impact on water quality. Because they all pump less than 100,000 gallons per day (70 gpm), all Zone I wellhead protection areas for the public water supply wells in Shutesbury have radii ranging from 100.5 to 231.7 feet.

For public water supply wells pumping more than 100,000 gallons per day, Zone IIs must be determined. A Zone II is defined as the area of the aquifer that contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (i.e., 180 days of pumping at an approved yield with no recharge from precipitation). The Drinking Water Regulations specify a number of prohibited and restricted land uses for Zone IIs that are similar to the prohibited and restricted land uses for surface water supplies (described above). If the water supplier owns the Zone II land, these prohibitions and restrictions can be readily enforced. Otherwise, the water supplier is expected to make best efforts to obtain zoning and non-zoning controls in the municipality(ies) in which the Zone II lies. Since all of the current public drinking water supply wells in Shutesbury pump less than 100,000 gallons per day, the water supplier must only demonstrate that it has complied with the Drinking Water Program's *Guidelines and Policies for Public Water Systems* and that the source of the water supply will achieve all applicable water quality standards set forth in the Drinking Water Regulations. In addition, Interim Wellhead Protection Areas (IWPAs) are required for public water supplies that have not delineated their Zone II recharge areas, and in Shutesbury, the radii of these IWPAs range in size from 422 feet to 568 feet and cover surface areas ranging from 12.8 to 23.3 acres. However, MassDEP may require that a water supplier proposing to construct, expand or replace a public water supply (pumping less than 100,000 gallons per day) delineate a Zone II and submit a groundwater monitoring well program plan for approval if MassDEP finds that the existing or proposed land uses (such as landfills or hazardous waste sites) within the IWPA may pose a threat to water quality. Should wells pumping more than 100,000 gallons per day be proposed for construction in the future, more rigorous requirements will apply and MassDEP can deny approval of new wells in developed source areas. Such large-scale water users would also be required to obtain a permit from MassDEP under the Water Resources Management Program Regulations.

As stated previously, DCR owns most of the Quabbin Reservoir watershed lands that are located in Shutesbury, either as Reservation and Off-Reservation Lands or as the Shutesbury State Forest, with the remainder being in private ownership. The Massachusetts **Watershed Protection Act Regulations** regulate land uses and activities on privately owned lands adjacent to certain mapped tributaries and surface waters and to their associated bordering vegetated wetlands (BVWs) and floodplains within the Quabbin Reservoir watershed for the purpose of protecting the quality of the drinking water supply. A substantial portion of the lands on Shutesbury's eastern slope are regulated by the Watershed Protection Act Regulations. These regulations address land uses in two critical areas. First, within 400 feet of water supply reservoirs and within 200 feet of tributary streams and surface water bodies, all alterations are prohibited. These include changing runoff characteristics; intercepting or diverting groundwater or surface water, constructing or reconstructing utilities; constructing, reconstructing or paving of roadways or other ways; driving pilings; installing or substantially expanding drainage systems; erecting, reconstructing or substantially expanding structures; draining, dumping, dredging, damming, discharging, excavating, filling or grading; and the

generation, storage, discharge and disposal of pollutants. However, exemptions (with certain conditions) exist for lawful uses, structures and facilities in existence on or before July 1, 1992. These include the construction of a single-family dwelling on an existing vacant lot; minor changes to an existing structure; the division of an owner-occupied existing parcel to create one additional building lot; the conversion of land to agricultural use under a plan approved by NRCS; the maintenance or improvement of land in agricultural use; the maintenance of existing public roadways; the construction of certain public highways or railroad tracks; the maintenance of public utilities; the cleanup or prevention of releases of hazardous materials or waste; and the construction of municipal sewage treatment systems or water systems (if there is no impact to water quality and these systems meet the appropriate regulations). Second, within locations between 200 and 400 feet from tributary streams and surface water bodies, the 100-year floodplain of a tributary or surface water, and BVWs that border on tributaries, surface waters or the Quabbin Reservoir, specific activities are prohibited and all development proposals are evaluated by DCR's Division of Water Supply Protection. Many of the prohibited activities are similar to those listed under MassDEP's Drinking Water Quality Regulations, although DCR's regulations contain additional prohibitions. Prohibited activities include the treatment, disposal, use, generation or storage of hazardous materials or wastes; the storage and disposal of solid waste; the storage of liquid petroleum products, except for residential uses with containment; the construction of a subsurface waste disposal system less than 4 feet above the maximum high groundwater table; the disposal of pollutants from sewage treatment facilities; the outdoor storage of de-icing chemicals, fertilizers, herbicides and pesticides; the use of certain pesticides or herbicides with high mobility ratings or which pose a threat to groundwater; the outdoor, uncovered storage of manure; the commercial servicing, repairing or washing of boats or motor vehicles; the operation of junk and salvage yards; the rendering impervious of more than 10 percent of any lot or 2,500 sq. ft., whichever is greater; the excavation of sand and gravel to a depth less than 6 feet above the high water table; the construction of a dwelling that exceeds 2 bedrooms per acre or which may generate more than 220 gallons of sanitary sewage per acre per day; and any alteration of a BVW. All project proposals must analyze the impacts of the project to surface water quality by comparing these to the Surface Water Quality Standards for Class A Surface Waters and Outstanding Resource Waters. DCR's Environmental Planning Section reviews permit applications; conducts site visits; issues advisory rulings, determinations of applicability, and variances; and takes appropriate actions to bring violators into compliance.

As previously stated, Shutesbury has a large number of smaller wetland areas located at the headwaters and along numerous tributaries that run through town (see Water Resources Map). The more significant smaller wetland areas are briefly described in the sections of this plan that focus on watersheds, and some of the more significant, unique or larger wetland areas are described in other sections of this plan. However, it is not within the purpose or scope of this plan to focus on every small wetland within the town's borders, especially since these small areas already receive significant protection under the state and federal laws and regulations and under the watchful eye of the Shutesbury Conservation Commission. Wetlands areas, including BVWs, Land under Water, riverbanks, and the 100-year floodplain receive regulatory protection under the WPA Regulations and the following maximum alteration thresholds are established: 5,000 square feet of BVW, Land Under Water or Land Subject to Flooding, and 50 linear feet of bank. All proposed alterations are required to be minimized or

mitigated. The WPA Regulations were designed to protect public and private drinking water and groundwater supplies, to protect wildlife habitat and fisheries, to control flooding, and to prevent storm damage and pollution. In addition, projects that will take place within the 100-foot Buffer Zone around banks or BVWs are subject to regulatory review. Furthermore, the 200-foot riverine corridor on both sides of a perennial stream or river (measured from the mean annual high water mark) is afforded additional protection under the Rivers Protection Act (Ch. 258 of the Acts of 1996) to protect the natural integrity of rivers and to encourage and establish open space along rivers**.** This law builds on the strength of the existing permitting procedures under the WPA to protect water quality, stabilize stream banks, reduce peak floods and downstream flooding, maintain habitat, and protect groundwater. Approximately 1,751 acres in Shutesbury lie within the Riverfront Area. Proposed projects in the Riverfront Area must have no significant impacts and demonstrate that no practical alternatives exist. Existing structures, such as single-family homes, roads, driveways, and utilities, are exempt from the Rivers Protection Act. The Shutesbury Conservation Commission issues permits for proposed work in wetlands and riverfront areas, with MassDEP serving as an appeal agency that may either overturn or support decisions that have been made at the local level.

The **Massachusetts Water Management Act** (MGL Ch. 216) and the **Water Resources Management Program Regulations** were established in 1986 to evaluate and control cumulative impacts to hydrologically-connected water sources, both surface water and groundwater. These regulations were promulgated to protect existing water uses, including hydropower resources, navigation, aquaculture, and water-based recreation; wildlife habitat and fisheries; wetlands; and land values, investments and enterprises that are dependent on previously allowed water withdrawals. Potential users proposing new water withdrawals of 100,000 gallons or more per day must apply for a permit from MassDEP and users with existing above-threshold withdrawals were all required to register with MassDEP when the regulations first went into effect.

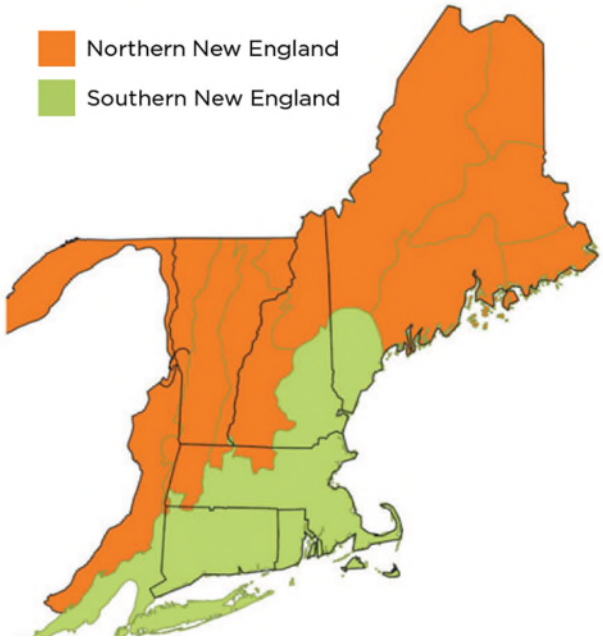
Forest Resiliency

The 2016 publication "Increasing Forest Resiliency for an Uncertain Future" by researchers from UMass Amherst, the University of Vermont, and the U.S. Forest Service[7] focuses on addressing the impacts of various stressors on New England's forests and offers recommendations for foresters, conservation groups, landowners, and municipal officials on how to increase forest resiliency in an uncertain future. Some of the stressors highlighted in the report include forest conversion, invasive plants, invasive insects and disease, over-browsing from deer, and climate change. These stressors interact with one another to increase their negative impacts, making it all the more important to address them as part of a larger whole.

[7] *Increasing Forest Resiliency for an Uncertain Future*. Catanzaro, Paul, Anthony D'Amato, and Emily Silver Huff. 2016. https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf

Maintaining healthy forests well into the future will necessitate addressing these stressors in an effort to increase forest resiliency, the capacity of a forest to respond to a disturbance by resisting damage or stress and recovering quickly. The authors break down forest resiliency into four goals: keep forest forested and connected, reduce stressors, reduce vulnerability, and provide refuge. Depending on the forest type, location, history, and surrounding landscape, forests will have varying degrees of vulnerability and resiliency.

Northern and Southern New England Ecoregions



Forest ecoregions: Shutesbury is located in the Southern New England ecoregion, not far from the Northern New England ecoregion.

Source: Increasing Forest Resiliency for an Uncertain Future. *Catanzaro, Paul, Anthony D'Amato, and Emily Silver Huff. 2016. https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf.*

Keep Forest Forested and Connected

Recently, the amount of forestland in New England has begun to decline again due to development. As most of the land in New England is family forest, owned by families and individuals, the decisions these family forest owners make about their land moving forward will likely be the most important drivers of forest change. The average age of family forest owners is over sixty, meaning the coming years will see a very large intergenerational transfer of land ownership. It is important for these landowners to make formal plans for the future of their land. Landowners can work with a local land trust or conservation organization to investigate options for conserving their land.

Conserving resilient forests and the linkages between them will help plant and animal species move to more suitable habitats as the climate changes. Large, intact forested areas will also be more likely to recover from extreme events such as droughts, wind storms, ice storms, and flooding. Although individual parcel sizes may be small, conserving critical connections between larger core habitat areas can make a big difference in species migration. In addition to land protection, communities can implement land use regulations that encourage natural resource conservation and minimize forest fragmentation and land clearing for development.

Reduce Stressors

There are many steps forest landowners can take to limit the amount of stressors that forests face to increase overall vigor and health. Invasive plants can out-compete native plants and

decrease overall plant diversity by dominating forests and reducing regeneration of native trees and plants. Invasive insects, like the hemlock woolly adelgid or the Asian long-horned beetle, have no natural predators and are significantly affecting species composition as trees susceptible to these insects are selectively killed. Landowners can work with foresters to prevent the introduction of invasive species, remove small populations of existing ones, and learn to manage extensive areas of infestation. Deer browsing can be so intense in some areas that regeneration of certain species can be inhibited. Limiting the impacts of deer browsing can be accomplished through allowing deer hunting to control deer populations, leaving tree tops whole that have fallen to the ground in order to provide enough light for seedlings to grow while also sheltering them from browsing, and protecting seedlings using temporary fencing or deer repellants.

Forest landowners can also take steps to maintain or restore soil and water health by ensuring forestry best management practices are used when conducting a timber harvest to reduce soil compaction and erosion and to promote soil fertility. Recreation on forest land can be directed away from easily erodible soils or other environmentally sensitive sites. Maintaining or restoring forested riparian buffers around water resources will help filter out sediment and contaminants and keep water temperatures cooler.

Reduce Vulnerability

A forest's vulnerability is it's susceptibility to undesired change from stressors. Forests with high complexity are more likely to withstand stressors and recover from disturbances. Complex forests have a diversity of tree species, including trees that are likely to do well in future climate conditions (see Figure 4-5 and 4-6), a variety of tree sizes, ages, and tree arrangements, and enough standing deadwood and logs on the ground. Forests with existing high complexity can be monitored over time for signs of vulnerability. Forests that are lacking in high forest complexity in one or more areas can become more resilient through forest stewardship activities such as creating openings of different sizes to promote regeneration of well-adapted species, thinning of forests to promote growth, and selectively felling trees to increase the amount of deadwood on the ground.

The following table provides tree species and predictions of how competitive they will be in the future. The values following each species name indicate whether species-suitable habitats will increase (+), decrease (−), or stay the same (●) under projected climate change.

Northern New England (Ecological subsections M211A, B, C, and D, and M211E and J)		
Tree Species	Low Emissions (PCM B1)	High Emissions (GFDL A1FI)
Balsam Fir	−	−
Black Spruce	−	−
Northern White Cedar	−	−
Paper Birch	−	−
Red Spruce	−	−
Tamarack	−	−
White Spruce	−	−
American Beech	●	−
Quaking Aspen	●	−
Sugar Maple	●	−
Yellow Birch	●	−
Bear/Scrub Oak	●	●
Bigtooth Aspen	●	●
Eastern White Pine	●	●
Red Maple	●	●
American Basswood	●	+
Bitternut Hickory	●	+
Black Cherry	●	+
Pitch Pine	+	●
Black Birch	+	+
Black Oak	+	+
Chestnut Oak	+	+
Northern Red Oak	+	+
Shagbark Hickory	+	+
White Oak	+	+
Threatened by Current Forest Health Issues (Do not target)		
Black Ash	−	−
Eastern Hemlock	●	●
White Ash	●	●

Southern New England (Ecological subsection M221A)		
Tree Species	Low Emissions (PCM B1)	High Emissions (GFDL A1FI)
Balsam Fir	−	−
Black Spruce	−	−
Eastern White Pine	−	−
Northern White Cedar	−	−
Paper Birch	−	−
Quaking Aspen	−	−
Red Spruce	−	−
White Spruce	−	−
Tamarack	−	●
American Beech	●	−
Northern Red Oak	●	−
Red Maple	●	−
Yellow Birch	●	−
Bear/Scrub Oak	●	●
Black Cherry	●	●
Sugar Maple	●	●
Bigtooth Aspen	+	●
Pitch Pine	+	●
American Basswood	●	+
Bitternut Hickory	+	+
Black Oak	+	+
Chestnut Oak	+	+
Shagbark Hickory	+	+
White Oak	+	+
Threatened by Current Forest Health Issues (Do not target)		
Black Ash	−	−
Eastern Hemlock	●	●
White Ash	●	●

The projected changes in tree species habitat (increase, decrease, or stay the same) under two future GHG emissions scenarios for each region. Source: Increasing Forest Resiliency for an Uncertain Future. Catanzaro, Paul, Anthony D'Amato, and Emily Silver Huff. 2016.
https://masswoods.org/sites/masswoods.net/files/Forest-Resiliency.pdf

The following species have either been sighted in Shutesbury or would be expected to be present based on what is known about their habitat requirements, regional distribution, migratory patterns, and abundance. They are not necessarily reproducing here, but would be expected to use Shutesbury for at least some of their annual habitat needs. Some species require only forest or wetland habit, whereas others use or require a mixture of habitats, including forests, wetlands and meadows. Home range sizes provided below are as described in *Forest Wildlife of Massachusetts: Cover Type, Size Class, and Special Habitat Relationships*[8] and *Wild Mammals of New England.*[9] The following NHESP state-listed species designations are indicated in brackets following the species name: Endangered (E), Threatened (T), and Special Concern (SC). The annotation Species of Greatest Conservation Need (*SGCN*) is also provided for species with the greatest need of conservation as identified in the Massachusetts Division of Fisheries & Wildlife's 2015 Massachusetts State Wildlife Action Plan.[10]

Wildlife Inventory

Mammals

As opposed to some bird species, none of the mammals inhabiting Shutesbury are migratory, and their home ranges are correlated with mobility, denning characteristics, food requirements, and the need for connectivity between diverse habitat types. Small mammals tend to only use small home ranges, whereas large mammals can have home ranges of several thousand to tens of thousands of acres. Because of the large blocks of continuous forest in and around Shutesbury, several mammals listed as using greater than 20,000 acres for their habitat have been seen often in town. These animals include the black bear, fisher, bobcat and moose.

Forest Habitats

Home range size unknown	northern flying squirrel (*SGCN*)
< 1 acre	deer mouse, white-footed mouse, masked shrew, long-tailed shrew, smoky shrew, eastern chipmunk, southern red-backed vole
1 – 5 acres	New England cottontail (*SGCN*), southern flying squirrel
5 – 10 acres	woodland jumping mouse, gray squirrel, red squirrel
10 – 50 acres	porcupine, snowshoe hare
100 – 500 acres	long-tailed weasel

[8] DeGraaf, Richard M. and David A. Richard, 1987, University of Massachusetts Cooperative Extension Service

[9] Godin, Johns Hopkins University Press, 1977

[10] Massachusetts Division of Fisheries & Wildlife Department of Fish & Game, State Wildlife Action Plan, 2015

10,000 v 20,000 acres	gray fox
> 20,000 acres	fisher, black bear (*SGCN*)

Mixed or Open Habitats

Home range size unknown	little brown myotis (E, *SGCN*)
< 1 acre	white-footed mouse, woodchuck, meadow vole, pine vole, southern red-backed vole, star-nosed mole, eastern mole, hairy-tailed mole, southern bog lemming *(*SC; *SGCN*)
1 – 5 acres	meadow jumping mouse, northern short-tailed shrew
10 – 50 acres	eastern cottontail, ermine
50 – 100 acres	Virginia opossum
100 – 500 acres	long-tailed weasel
1,000 – 5,000 acres	white-tailed deer, raccoon, striped skunk
10,000 – 20,000 acres	red fox, coyote
> 20,000 acres	big brown bat (*SGCN*), bobcat (*SGCN*), moose (*SGCN*)

Wetland Habitats

<1 acre	water shrew (SC**,** *SGCN*)
1 – 5 acres	beaver, muskrat
1,000 – 5,000 acres	Mink

Birds

Many birds are present in Shutesbury only during the breeding season, and a few only for foraging during short stay-overs during migration. A number of birds are year-round residents, however, and these species are shown in italics below.

Forest Habitats

Home range size unknown	*blue jay*, r*ed-breasted nuthatch*, *brown creeper*, *golden-crowned kinglet*, ruby-crowned kinglet, solitary vireo, veery, black-throated blue warbler, black-and-white warbler, scarlet tanager, purple finch, evening grosbeak, *American crow*, *common raven*, *pileated woodpecker*, broad-winged hawk
<1 acre	cedar waxwing
1 – 5 acres	red-eyed vireo, magnolia warbler, black-throated green warbler, Blackburnian warbler, ovenbird, *white-throated sparrow* (*SGCN*), yellow-rumped warbler, winter wren
5 – 10 acres	eastern phoebe, wood thrush (*SGCN*), *downy woodpecker*, *hairy woodpecker*, yellow-bellied sapsucker, *red-bellied woodpecker*, *ruffed grouse* (*SGCN*)

10 – 50 acres	*black-capped chickadee*, *white-breasted nuthatch*, eastern whip-poor-will (SC, *SGCN*)
50 – 100 acres	*slate-colored junco*
100 – 500 acres	*red-shouldered hawk*, *northern saw-whet owl*
>500 acres	northern goshawk (*SGCN*)

Mixed or Open Habitats

Home range size unknown	hermit thrush, *European starling*, yellow warbler, rose-breasted grosbeak, eastern towhee (*SGCN*), American tree sparrow, *house sparrow*, Baltimore oriole, *house finch*, barn swallow, tree swallow, purple martin (*SGCN*), *mourning dove*, killdeer, spotted sandpiper, turkey vulture, *eastern screech-owl*, *great horned owl*, hooded merganser, *Carolina wren*
<1 acre	least flycatcher, *American robin*, gray catbird, Nashville warbler (*SGCN*), American redstart, ruby-throated hummingbird
1 – 5 acres	house wren, brown thrasher (*SGCN*), Canada warbler (*SGCN*), *field sparrow* (*SGCN*), grasshopper sparrow (T, *SGCN*), *song sparrow*, *American goldfinch*, northern flicker, indigo bunting
5 – 10 acres	great-crested flycatcher, common yellowthroat, chipping sparrow, *eastern bluebird*
10 – 50 acres	*tufted titmouse*, eastern peewee, eastern kingbird, *northern mockingbird*, chestnut-sided warbler, brown-headed cowbird, *ring-necked pheasant*, wood duck, green-winged teal
50 – 100 acres	*northern cardinal*, common nighthawk (*SGCN*), American woodcock (*SGCN*)
100 – 500 acres	sharp-shinned hawk
500 – 1,000 acres	barred owl
1,000 – 5,000 acres	wild turkey, bald eagle (SC, *SGCN*), northern harrier (T, *SGCN*), Cooper's hawk, red-tailed hawk, American kestrel (*SGCN*)

Wetland Habitats

Home range size unknown	*belted kingfisher*, common snipe, Virginia rail, common loon (SC, *SGCN*), American bittern (E, *SGCN*), least bittern (E, *SGCN*), great blue heron, green-backed heron, black-crowned night heron (*SGCN*), *Canada goose*, common goldeneye, common merganser, double-crested cormorant (*SGCN*), osprey

1 – 5 acres	red-winged blackbird
5 – 10 acres	pied-billed grebe (E, *SGCN*), *American black duck* (*SGCN*)
100 – 500 acres	blue-winged teal (*SGCN*)
1,000 – 5,000 acres	*Mallard*

Amphibians and Reptiles

Some amphibians require vernal pools (i.e., temporary pools present during the spring breeding season that are devoid of fish), others use permanent water bodies to breed and spend the rest of their time in the woods, and others spend most of their adult and juvenile lives in wetlands.

Forest Habitats

Home range size unknown	northern dusky salamander, northern spring salamander, gray tree frog
<1 acre	wood frog, red-backed salamander
10 and 50 acres	Northern copperhead (E, *SGCN*)

Mixed or Open Habitats

Home range size unknown	four-toed salamander, eastern American toad, pickerel frog, gray tree frog, blue-spotted salamander (SC, *SGCN*), northern ringneck snake
<1 acre	northern spring peeper, green frog, northern two-lined salamander, red-spotted newt, northern brown snake, northern red-bellied snake, eastern smooth green snake
1 – 5 acres	northern leopard frog (*SGCN*), eastern painted turtle
5 – 10 acres	bullfrog, marbled salamander (T, *SGCN*), blue-spotted salamander (SC, *SGCN*), eastern garter snake
10 – 50 acres	wood turtle (SC, *SGCN*), eastern box turtle (SC, *SGCN*), Jefferson salamander (SC, *SGCN*), northern black racer, eastern milk snake

Wetland Habitats

Home range size unknown	common snapping turtle, stinkpot, spotted turtle (*SGCN*)
1 – 5 acres	eastern ribbon snake (*SGCN*), northern water snake
5 – 10 acres	bull frog

Fish

The surface waters of Shutesbury are home to Atlantic salmon (*SGCN*, restricted to Quabbin and adjacent portions of the West Branch of the Swift River), brook trout (*SGCN*), rainbow trout, lake trout, brown trout, largemouth bass, smallmouth bass, chain pickerel, yellow perch, pumpkinseed, brown bullhead, golden shiner, banded killifish, fallfish (*SGCN*) and white sucker (*SGCN*).

Invertebrates

Numerous invertebrates exist in Shutesbury, including many varieties of butterflies, moths, bees and wasps, dragonflies and damselflies, beetles, spiders, mollusks, crustaceans and worms. Both terrestrial and aquatic invertebrates serve as food sources for numerous mammals, fish, birds, reptiles and amphibians, whereas others serve to pollinate flowering plants. In 2009, NHESP listed the ski-tailed emerald (SC, *SGCN*), a type of rare dragonfly. In addition, NHESP has listed another rare species of dragonfly, the spatterdock darner (SC), as living on the Quabbin Reservoir wetlands, although sightings of this dragonfly have not yet been confirmed in Shutesbury, to date and the state has proposed de-listing the species from MESA. The New England bluet, was delisted from MESA after further study demonstrated larger populations present in the state than previously found.

Invasive Plants, Forest Pests and Diseases

Invasive plants constitute a major environmental concern for Shutesbury. The Massachusetts Invasive Plant Advisory Group has developed a list of 69 plant species that it has classified as being either invasive, likely invasive, or potentially invasive.[11] The list includes a number of trees, shrubs, and herbaceous plants that were previously not considered to be invasive and are known either to grow in the wild or to have been previously used as landscaping plants, such as Norway maple, sycamore maple, black locust, multiflora rose, Japanese barberry, winged euonymous, autumn olive, common buckthorn, various honeysuckle species, oriental bittersweet, garlic mustard, dame's rocket, coltsfoot and yellow iris. The Massachusetts Department of Agricultural Resources has placed importation bans and propagation bans on these invasive species.

Invasive species typically have one or more adaptations that allow them to out-compete native species, e.g., extensive and resilient root systems, the ability to produce large numbers of stress-tolerant seeds that may remain viable for long periods of time, the ability to disperse over spatial gaps, and fast growth rates. Although it is prudent to be aware of the spread of any invasive species, particularly in newly cleared areas, wetland areas tend to be the most susceptible to takeover by invasive species such as purple loosestrife, phragmites, reed canary-grass, Japanese knotweed, water chestnut, variable water-milfoil, Eurasian water-milfoil, and curly pondweed. The best way to control potential impacts to wetlands is to monitor these areas for invasive growth (as is already being done in Lake Wyola) and to conduct ongoing maintenance programs for periodic removal of invasive species. Although invasives are not currently a problem in the riparian corridor along the Sawmill River in

[11] https://www.massnrc.org/mipag/index.htm, last accessed 11/13/2020

Shutesbury, they are a problem downstream in neighboring communities. Therefore, it may be only a matter of time before invasive riparian plants migrate upstream. Plans for projects proposing to clear vegetation from riverbanks or alter or replicate bordering vegetated wetlands should contain provisions for rapidly reestablishing temporary vegetative cover, actively planting and seeding altered areas with native species, and monitoring and controlling invasive growth until native species can become reestablished.

Because Shutesbury has such extensive forest cover, another environmental concern is the recent invasion of forests in the Northeast by five insect pests and one disease: the hemlock wooly adelgid, the European gypsy moth, the Asian longhorn beetle, the emerald ash borer, and beech bark disease. The hemlock wooly adelgid is an aphid relative that attacks Eastern hemlocks by withdrawing sap and damaging the plant's vascular system.[12] This pest produces two generations per year, one of which actively feeds in winter when predatory insects are absent. Plants growing in stressful sites (i.e., those with ledgy soils, poor drainage, or droughty conditions) can succumb within 3 to 5 years of invasion. Healthy hemlocks on good growing sites may take 7 to 10 years before showing signs of decline. There are no commercially available biological agents, and treating forest stands with horticultural oils is difficult. Shutesbury contains a number of hemlock forests that provide habitat for a number of species of birds and mammals. In addition, hemlock forests along trout streams provide necessary shade to keep the waters cool. Hemlock wooly adelgids have already been reported in Shutesbury, but their numbers are growing slowly at the present time.

The European gypsy moth is the major introduced pest of the eastern United States hardwood forests and the first outbreak of the European gypsy moth occurred in Massachusetts in 1889.[13] The European gypsy moth prefers species of oak but will attack up to 600 different species of deciduous and evergreen trees and shrubs, including maples, elms, birches, poplars, willows, aspens, cherries, alders, apples, hawthornes, basswood, cottonwood, pines, hemlocks, and spruces. The European gypsy moth dislikes and avoids ashes, sycamore, rhododendrons, mountain laurel, cedars, black walnut, balsam fir and flowering dogwood, but will eat almost anything during an outbreak when competition is fierce. Females lay from 100 to 1,500 eggs per egg mass in July that hatch into larvae in April and May when hardwood trees are beginning to bud. During an outbreak, up to 1,000 egg masses may be present per hectare. Newly-hatched larvae attached to silken threads can be carried by the wind for distances of up to 1 mile. Until pupating in mid-June to early July, larvae eat the tree's leaves, mostly during the night, except during the height of outbreaks when leaf-eating occurs during the day, as well. Healthy trees can survive a single defoliation, but weak or stressed trees cannot. However, repeated defoliations during cyclical outbreaks can stress and kill trees. In oak-dominated stands, outbreaks last from 2 to 5 years, with moth populations remaining low for the next 4 to 12 years. Stands of trees containing more than 50 percent oak (as opposed to oak-pine or mixed hardwood stands), particularly those growing on dry rock ridges, have the highest mortality rates. Furthermore, pines and hemlocks are more likely to be killed by an outbreak than hardwoods, with a complete defoliation killing up to 50 percent of the pines

[12] https://ag.umass.edu/landscape/fact-sheets/hemlock-woolly-adelgid, accessed 11/13/2020.

[13] https://ag.umass.edu/landscape/fact-sheets/gypsy-moth, accessed 11/13/2020.

and 90 percent of the hemlocks. Pesticides may be used to control outbreaks, but these are usually toxic to other moths, butterflies, bees, and some gypsy moth parasites. Fortunately, gypsy moths do have a number of natural predators, including a number of insects, birds, small mammals, bacteria, fungi and viruses that can help to keep outbreaks in check. In addition, periods of very low winter temperatures can kill the eggs, alternating freezing and thawing cycles in late winter can prevent hatching, and rainy weather can inhibit the dispersal and feeding of larvae.

Until recently, infestations of the Asian longhorn beetle were present only in southern New York, New Jersey and Illinois. In August 2008, however, the Asian longhorn beetle was discovered in nearby Worcester, MA, and the current outbreak (last observed January 2020) there is one of the largest outbreaks that the U.S. Forest Service ever observed in the nation.[14] This beetle prefers various species of maples, including sugar maple, red maple, silver maple, Norway maple and box elder, although it will also attack various species of willow, elm, birch, poplar, ash and horse chestnut. Asian longhorn beetles lay between 35 and 90 eggs which hatch into larvae that bore deeply into trees. The larvae feed on the vascular system during the fall and winter and eventually girdle the tree, thereby preventing the flow of food and water within the tree and resulting in death. There are no known natural predators in the U.S., and since the larvae spend most of their time in deep burrows, infestations are difficult to control. Although labor-intensive in their application, insecticides can be effective if injected into the soil or the trunks, but only if this is done prior to the outbreak of an infestation. The larvae can be readily transported from one region to another in lumber and firewood and the only assured control method is to cut, chip and burn infested trees and replace them with non-host species. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service has stated that the Asian longhorn beetle has the potential to cause more damage than Dutch Elm disease, chestnut blight, and gypsy moths combined. Potential impacts in the Northeast are to the maple syrup, lumber, tourism and nursery industries. In Shutesbury, an infestation of this beetle could impact ongoing lumber harvesting operations, drastically change the composition of the forest community, and destroy large blocks of deciduous forest that currently serve as wildlife habitat, support recreational uses, and preserve the prized rural character of the area.

Species in the ash genus are the preferred target of emerald ash borer, which has been present in Massachusetts since 2012.[15] Emerald ash borer is a wood attacker whose larvae feed in the nutrient- and water-conducting tissues beneath the bark, which can ultimately girdle and kill the tree. The larvae damage appears as S-shaped galleries underneath the bark and the exit holes of the emerging adults are visible as D-shaped exit holes. Vertical splits or cracks, canopy dieback, water-sprouts or epicormics shoots, and woodpecker feeding activity may also signal infestation. Emerald ash borers prefer to feed on stressed trees, but are known to also attack healthy trees. When populations are high, small trees can die within 1 to 2 years of initial infestation and larger trees within 3 to 4 years. Chemical management is an option for ash trees in a landscaped or urban forest setting if applied before the crown exhibits more

[14] https://ag.umass.edu/landscape/fact-sheets/asian-longhorned-beetle, accessed 11/13/2020.

[15] https://ag.umass.edu/landscape/fact-sheets/emerald-ash-borer, accessed 11/13/2020.

than 30% dieback. Four wasp species have been approved as biological controls of this pest, and the hope is that with time these organisms can catch up to the populations of emerald ash borer so as to keep the pest in check enough to preserve ash trees in forested settings. Until this happens though, human cultural practices such as not moving firewood and quarantining ash materials are among the best measures for slowing the spread. As of 2020, emerald ash borer has been detected in all Massachusetts counties except Barnstable, Dukes, and Nantucket counties. It has not yet been detected in Shutesbury, but was detected in neighboring Pelham and Leverett in 2020 and Amherst in 2019, so it is only a matter of time before the pest is found in Shutesbury.

Beech bark disease is a disease-insect complex in which two species of scale insect (Cryptococcus fagisuga and Xylococculus betulae) pierce the main trunk and primary scaffold branches of a beech tree, leaving wounds that are then colonized by species of a fungal pathogen in the Neonectria genus.[16] As bark is killed, trees develop rough and cankered bark, which in turn attracts other boring insects and wood-boring bird species. Likewise, the rotting wood attracts other species of wood-rotting fungi that further invades and weakens the tree. Management of the disease in its early stages includes systemic insecticides and horticultural oil to smother the scale insect and in its later stages a lower trunk drench with phosphites. While the disease has caused significant die off, especially of large specimens, some research has also found that some beech trees are resistant and call wall out the fungus so the necroses do not reach the cambium layer. It is not known precisely when beach bark disease came to Shutesbury, but it has been affecting beech trees in the eastern United States since the 1930s thru 1960s.

With the vast tracts of highly valued, forested land present in Shutesbury, outbreaks involving one or more of these insect pests could be devastating. With this concern in mind, it may be useful for the Town to make efforts to educate town boards, large landowners who may not already be familiar with these insect pests and recreational users of the forests to look for and report back on warning signs of potential outbreaks. In addition, prior to making decisions to purchase particular tracts of forested land that are considered valuable for open space protection purposes, inspecting the land for the presence of such pests may be prudent to determine if eradication methods are feasible or if limited funds might be better spent on other non-impacted tracts of land that provide comparable habitat, or aesthetic or recreational value. If Shutesbury is interested in maintaining the character and integrity of its many forests, for scenic value, biological diversity, and recreational activities, it is essential that pests that could cause widespread devastation be observed in time and managed, if not eradicated.

[16] https://ag.umass.edu/landscape/fact-sheets/beech-bark-disease, accessed 11/13/2020.

APPENDIX B

OPPORTUNITIES FOR FUNDING OPEN SPACE AND CONSERVATION PROJECTS

The opportunities for the Town of Shutesbury to procure funding for open space projects can be a challenge. Shutesbury is a small town with limited financial resources available for funding open space projects. The following paragraphs provide a brief description of some available resources for funding open space and conservation projects, with applicant type noted below the grant name. Many of these grants are offered by the Department of Conservation Services and Towns are eligible for the funding with an approved and updated 7-year Open Space and Recreation Plan. In addition, two reports from the Highstead Foundation and Harvard Forest provide additional information on recent trends in private and public funding of land conservation in New England:

Foundation Funding for Land Conservation in the Northeast: Trends in Grant Making between 2004 and 2014 - https://www.wildlandsandwoodlands.org/sites/default/files/Foundation percent20Report percent202019 percent20- percent20FINAL.pdf

Public Conservation Funding in New England: Recent Trends in Government Spending on Land Protection - https://www.wildlandsandwoodlands.org/sites/default/files/Public percent20Funding percent20LR.pdf

G.1 Regional and Statewide Conservation Organizations

Local and statewide conservation organizations exist to conserve and steward land in partnership with municipalities and landowners. In addition to providing various paths toward protecting land from development, they are also experienced partners in many of the following funding opportunities.

In addition to Kestrel Land Trust (https://www.kestreltrust.org/) and Mount Grace Land Conservation Trust (https://www.mountgrace.org/), several other regional and statewide conservation organizations are available for partnership conservation projects, including the New England Forestry Foundation (https://newenglandforestry.org/), The Trustees of Reservations (thetrustees.org), Massachusetts Audubon Society (https://www.massaudubon.org/), and The Nature Conservancy (https://www.nature.org/en-us/). Some of the conservation organizations identified above have access to no-interest or low-interest loan funds to assist in the conservation of significant natural resources through the Norcross Wildlife Foundation's loan program and the Open Space Institute's funding programs.

G.2 Grant Opportunities

Local Acquisitions for natural Diversity (LAND) Grant Program (formerly the Self-Help grant program)

Municipal conservation and agricultural commissions

The Commonwealth of Massachusetts offers a grant program through the Executive Office of Energy and Environmental Affairs, Division of Conservation Services, to assist municipalities with open space projects. This program was formerly known as the "Self Help" grant program and is now entitled the LAND grant program (Local Acquisitions for Natural Diversity). Conservation or Agricultural Commissions from communities with up-to-date Open Space and Recreation Plans are eligible to apply for reimbursement grants to acquire land for conservation and passive recreation in fee or for a conservation restriction. The grant supports the purchase of forests, fields, wetlands, wildlife habitat, unique natural, cultural, or historic resources, and some farmland. The public must have reasonable access to the land. Reimbursement rates are between 50 and 70 percent, with a maximum grant award of $400,000.

https://www.mass.gov/service-details/local-acquisitions-for-natural-diversity-land-grant-program

PARC Grant Program

Municipalities

The Parkland Acquisitions and Renovations for Communities (PARC) Grant Program, offered by the Executive Office of Energy and Environmental Affairs, Division of Conservation Services, was established to assist cities and towns in acquiring and developing land for park and outdoor recreation purposes. These grants can be used by municipalities to acquire parkland, build a new park, or to renovate an existing park. Applications are open to all municipalities that have submitted an up-to-date Open Space and Recreation Plan; however, the number of residents in a town may affect the grant amount. Reimbursement rates are between 52-70 percent, with a maximum grant award of $400,000.

https://www.mass.gov/service-details/parkland-acquisitions-and-renovations-for-communities-parc-grant-program

Massachusetts Land and Water Conservation Fund Grant Program

Municipalities

The Massachusetts Land and Water Conservation Fund Grant Program is offered through the Executive Office of Energy and Environmental Affairs, Division of Conservation Services, and is funded by the Federal Land and Water Conservation Fund. The program provides up to 50 percent reimbursement for the acquisition of parkland or conservation land, creation of new parks, renovations to existing parks, and development of trails. Municipalities with up-to-date Open Space and Recreation Plans are eligible to apply.

https://www.mass.gov/service-details/massachusetts-land-and-water-conservation-fund-grant-program

Conservation Partnership Grant Program

Non-profits

This is a State grant program that is designed to help land trusts and other non-profit conservation organizations acquire interests in land for conservation or recreation purposes. Potential projects fall into one of two categories: acquisition of the fee interest in land or a conservation restriction; or due diligence for land or a conservation restriction that was donated to the organization. The maximum reimbursement amount available for a single project is 50 percent of the total eligible project cost up to the grant award maximum of $85,000. This is a resource that could be helpful to Shutesbury because there are several parcels in Town with high conservation value and only temporary protection status that organizations that conservation organizations might be interested in working with the Town to conserve. The challenge will be finding funds for the remaining 50 percent of the project.

https://www.mass.gov/service-details/conservation-partnership-grant-program

Landscape Partnership Grant Program

Federal, state, local governments and non-profits

This State grant program provides funding for large-scale (minimum of 500 acres), joint conservation projects completed in partnership with federal, state, and local governments, and non-profits. The grant is a reimbursement for up to 50 percent of the project cost with a maximum grant award of $1,250,000. Eligible projects include purchase of land in fee simple for conservation, forestry, agriculture, or water supply purposes; purchase of a Conservation Restriction, Agricultural Preservation Restriction, or Watershed Preservation Restriction; and construction of a park or playground in communities with less than 6,000 residents. Applications must be submitted jointly by two or more applicants including municipalities, non-profits, and State agencies.

https://www.mass.gov/service-details/landscape-partnership-grant-program

Agricultural Lands Conservation Program / Wetlands Reserve Easements

Landowners

This is a federal funding program through the United States Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS). The program provides financial and technical assistance to help conserve agricultural lands and wetlands. Under the Agricultural Land Easements component of the program, NRCS helps state and local governments and conservation organizations protect working agricultural lands and limit non-agricultural uses of the land. NRCS provides up to 50 percent of the fair market value of the

agricultural land restriction. Under the Wetlands Reserve Easements component of the program, NRCS helps to restore, protect and enhance wetlands. Depending on the length of the restriction, NRCS may pay up to 100 percent of the cost of the restriction as well as wetland restoration costs.

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ma/home/?cid=nrcs143_008419

MDAR Stewardship Assistance and Restoration on APRs

APR landowners

This grant is intended to help APR landowners restore APR land that was once in agricultural production to allow it to be put back into production. In addition, funds may be used to restore farm resources that have been negatively impacted by flooding, erosion, storms, tornadoes and other natural disasters or for restoration on land impacted by a third party.

https://www.mass.gov/service-details/stewardship-assistance-and-restoration-on-aprs-sara

Recreational Trails Program

Municipalities, non-profits, and landowners

This grant is a federal assistance program of the United States Department of Transportation's Federal Highway Administration (FHWA), administered at the State level through MassTrails, part of the DCR. It provides funding for the development and maintenance of both motorized and non-motorized recreational trail projects.

https://www.mass.gov/guides/recreational-trails-program

Complete Streets Funding Program

Municipalities

Technical assistance and construction funding to municipalities that have passed a Complete Streets Policy and developed a Prioritization Plan.

https://gis.massdot.state.ma.us/completestreets

Community Forest and Open Space Conservation Program

Municipalities, non-profits, federally recognized Indian tribes

This grant provides funds to establish community forests through fee simple acquisition of private forest land from a willing seller. The program aims to establish community forests by protecting forest land from conversion to non-forest uses and providing community benefits.

https://www.mass.gov/guides/community-forest-grant-program

Partners for Fish and Wildlife

Municipalities, non-profits, landowners, and tribal organizations

This grant program supports fish and wildlife conservation projects on private lands. Eligible projects include restoring trust with local communities, modernizing fish and wildlife infrastructure, conservation projects near National Wildlife Refuge lands, expansion of priority habitats and wildlife corridors, and regional strategic conservation plans. Awards of up to $750,000 are available. Consult with your Regional Partners for Fish and Wildlife Program office before submitting an application.

https://www.fws.gov/partners/

Clif Bar Family Foundation Small Grants Program

Non-profits and other small- or medium-sized organizations

The Foundation supports innovative small and mid-sized groups working to protect the Earth's beauty and bounty, create a healthy food system, increase opportunities for outdoor activity, reduce environmental health hazards, and build stronger communities.

http://clifbarfamilyfoundation.org/Grants-Programs/Small-Grants

MassWildlife Habitat Management Grant Program

Municipalities and landowners

This provides funds to owners of conserved lands to enhance wildlife habitat, while promoting public access for outdoor recreation. The grant encourages landowners to engage in active habitat management on their properties to benefit many types of wildlife, including game species and species of greatest conservation need. Over the past 5 years, the MHMGP has awarded over $1.9M in funding for 74 habitat projects.

https://www.mass.gov/guides/masswildlife-habitat-management-grant-program-mhmgp

Municipal Vulnerability Preparedness Action Grants

Municipalities

This grant offers financial resources to municipalities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts. Municipalities that have received designation as Climate Change Municipal Vulnerability Preparedness (MVP) Communities map apply. All projects are required to provide monthly updates, project deliverables, a final project report, and a brief project summary communicating lessons learned. The municipality is also required to match 25 percent of the total project cost using cash or in-kind contributions.

https://www.mass.gov/service-details/mvp-action-grant

Community Preservation Act

Municipalities and Non-profits

The Community Preservation Act is legislation that allows cities and towns to raise funds for use in local open space, historic preservation, community housing, and outdoor recreation projects. The Community Preservation Act (CPA) provides new funding sources which can be used to address three core community concerns:

- Acquisition and preservation of open space
- Creation and support of affordable housing
- Acquisition and preservation of historic buildings and landscapes

A minimum of 10 percent of the annual revenues of the fund must be used for each of the three core community concerns, and up to 5 percent may be used for administrative expenses of the Community Preservation Committee. The remaining funds can be allocated for any combination of the allowed uses, or for land for recreational use. This gives each community the opportunity to determine its priorities, plan for its future, and have the funds to make those plans happen.

https://www.communitypreservation.org/about

APPENDIX C

ADA TRANSITION PLAN

APPENDIX D

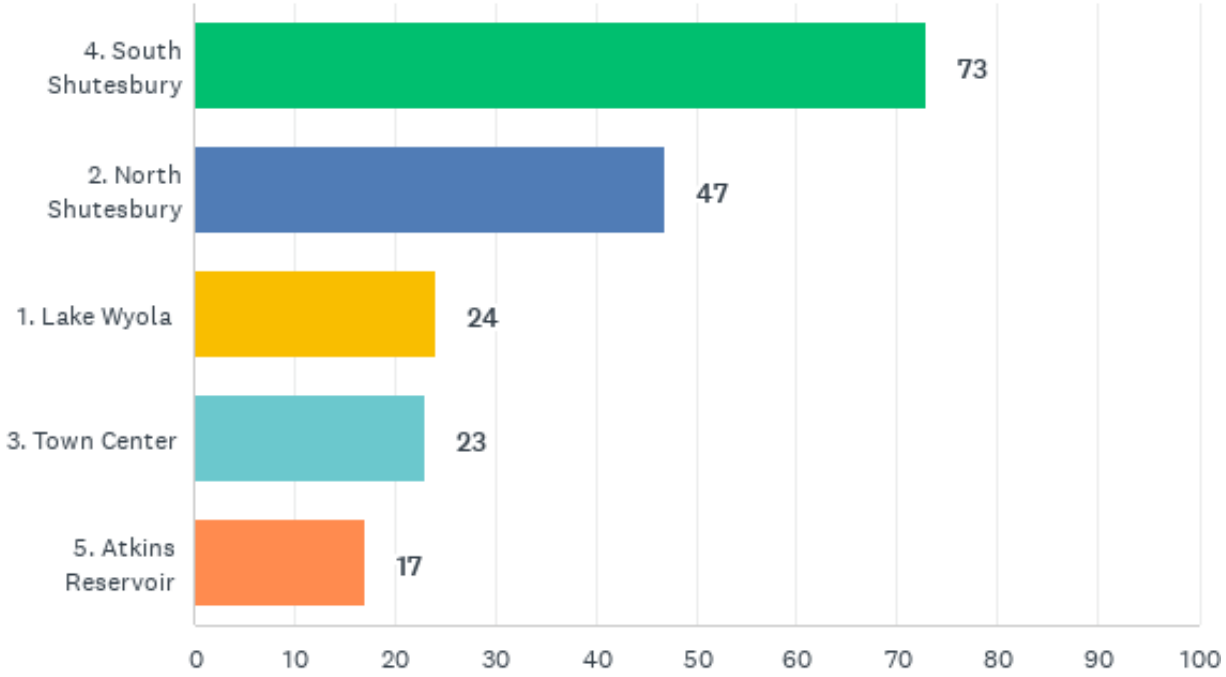
2021 OPEN SPACE AND RECREATION SURVEY AND RESULTS

2021 Shutesbury Open Space and Recreation Survey

186 Completed Responses

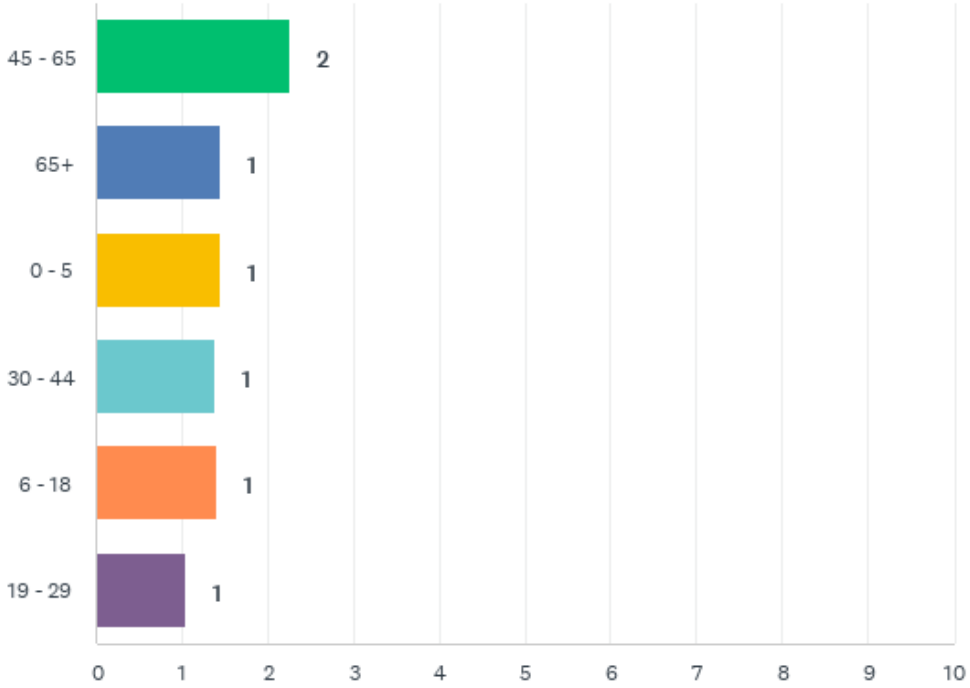
Q1: In what part of Shutesbury do you live?

Answered: 184 Skipped: 2



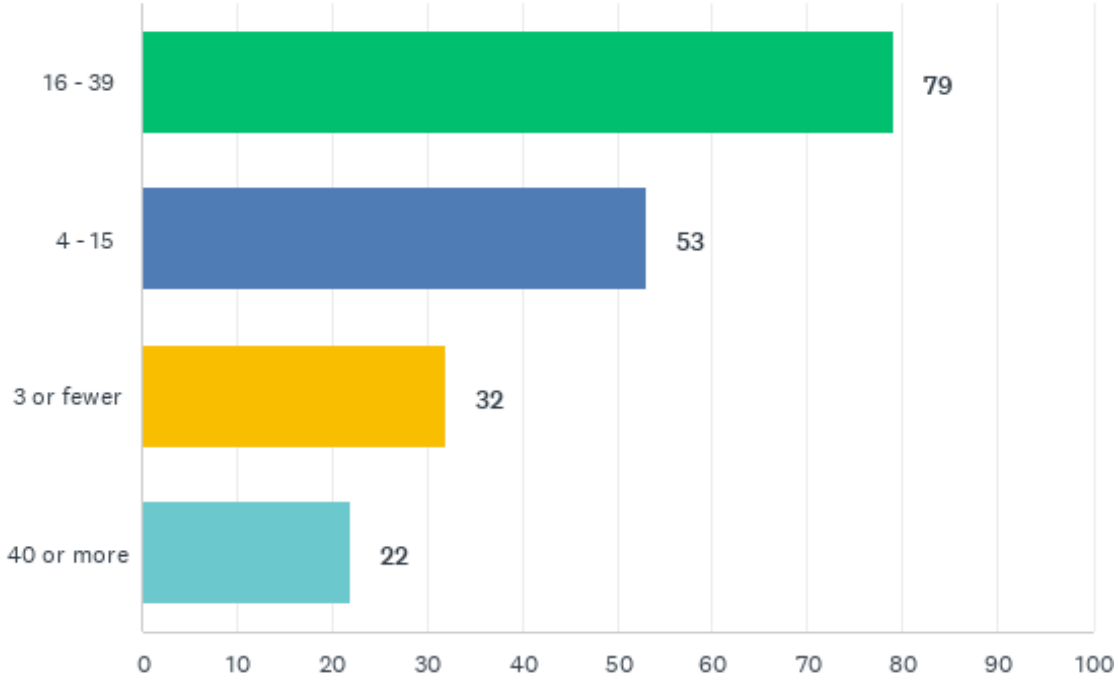
Q2: How many people in your household in each age group, including yourself?

Answered: 184 Skipped: 2



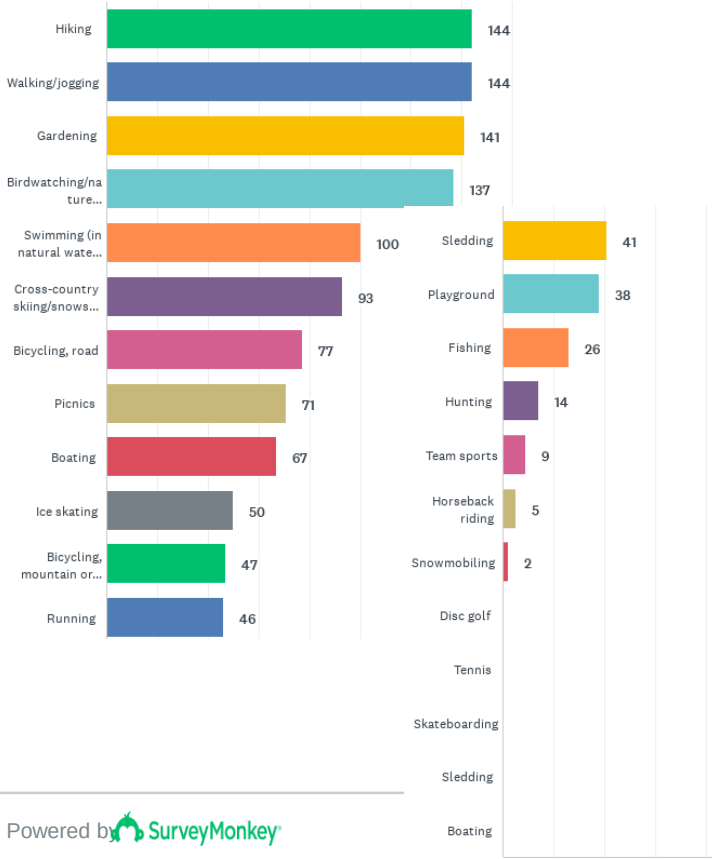
Q3: How many years have you lived in Shutesbury? (Select one)

Answered: 185 Skipped: 1



Q4: What outdoor activities do you enjoy in Shutesbury? (Select all that apply)

Answered: 169 Skipped: 17



ANSWER CHOICES	RESPONSES	
Hiking	85.21%	144
Walking/jogging	85.21%	144
Gardening	83.43%	141
Birdwatching/nature observation	81.07%	137
Swimming (in natural water bodies)	59.17%	100
Cross-country skiing/snowshoeing	55.03%	93
Bicycling, road	45.56%	77
Picnics	42.01%	71
Boating	39.64%	67
Ice skating	29.59%	50
Bicycling, mountain or gravel	27.81%	47
Running	27.22%	46
Sledding	24.26%	41
Playground	22.49%	38
Fishing	15.38%	26
Hunting	8.28%	14
Team sports	5.33%	9
Horseback riding	2.96%	5
Snowmobiling	1.18%	2
Disc golf	0.00%	0
Tennis	0.00%	0
Skateboarding	0.00%	0
Sledding	0.00%	0
Boating	0.00%	0
Total Respondents: 169		

Q5: If you hike in Shutesbury, where do you hike?

140 responses

33 - Trails near my house

29 - Quabbin/DCR property

The following spots received between 10 and 19 responses:

Atkins Reservoir

Cowls Land

M&M Trail

Houston-Gage

South Brook Conservation Area

Many other locations in town were mentioned less than 5 times

A number of responses were nearby locations but outside of Shutesbury: Rattlesnake Gutter, Pig Pen Ledges, Fiske Pond, Buffam Falls

Q6: If you swim in Shutesbury, where do you swim?

117 responses

96 - Lake Wyola, with some of those at private LW beaches

2 - Baker Reservoir

Others that got 1 vote: Atkins, streams, Cascades, Dean Brook

Some mentioned spots outside of Shutesbury: Lake Mattawa, Fiske Pond, Ruggle Ponds

Q7: If you mountain bike in Shutesbury, where do you mountain bike?

50 responses – lowest response, the majority of people did not answer this question

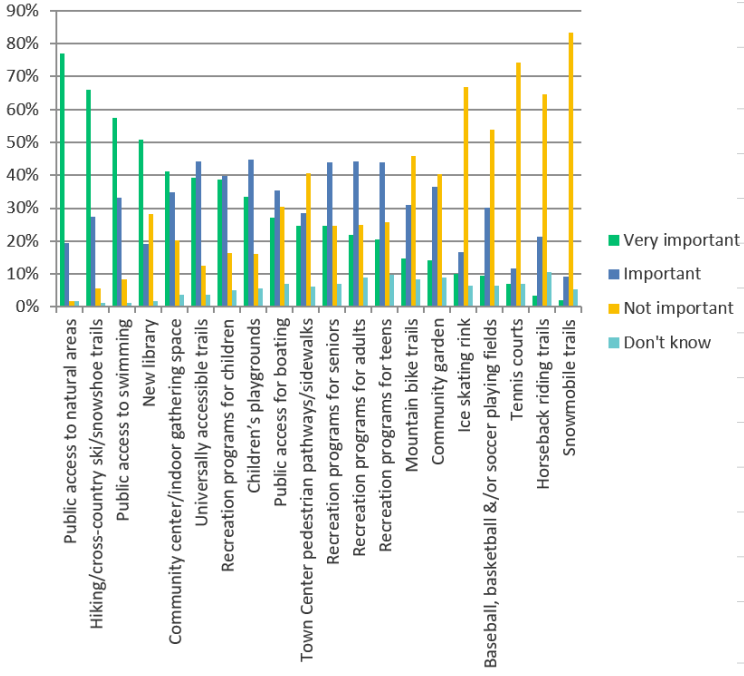
8 - woods all over town
8 - near where I live (it seemed like many others also used areas near where they lived)

20 different places were listed, but none got more than 3 votes

Only 1 mentioned South Brook Conservation Area

Q8: How important are the following recreation resources to you?

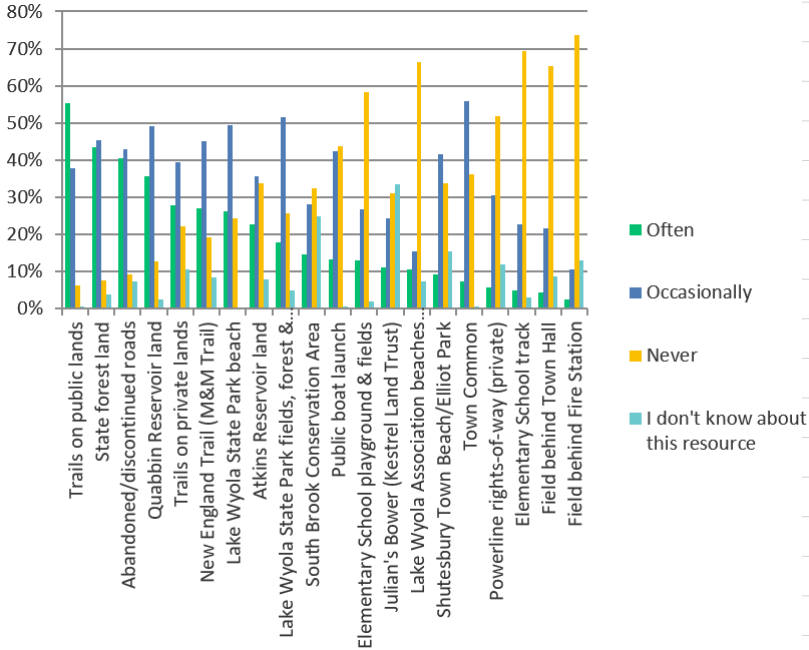
Answered: 168 Skipped: 18



	VERY IMPORTANT	IMPORTANT	NOT IMPORTANT	DON'T KNOW	TOTAL
Public access to natural areas	76.97% 127	19.39% 32	1.82% 3	1.82% 3	165
Hiking/cross-country ski/snowshoe trails	65.84% 106	27.33% 44	5.59% 9	1.24% 2	161
Public access to swimming	57.32% 90	33.12% 52	8.28% 13	1.27% 2	157
New library	50.92% 83	19.02% 31	28.22% 46	1.84% 3	163
Community center/indoor gathering space	41.14% 65	34.81% 55	20.25% 32	3.80% 6	158
Universally accessible trails	39.24% 62	44.30% 70	12.66% 20	3.80% 6	158
Recreation programs for children	38.61% 61	39.87% 63	16.46% 26	5.06% 8	158
Children's playgrounds	33.33% 52	44.87% 70	16.03% 25	5.77% 9	156
Public access for boating	27.10% 42	35.48% 55	30.32% 47	7.10% 11	155
Recreation programs for seniors	24.53% 39	44.03% 70	24.53% 39	6.92% 11	159
Town Center pedestrian pathways/sidewalks	24.68% 39	28.48% 45	40.51% 64	6.33% 10	158
Recreation programs for adults	21.79% 34	44.23% 69	25.00% 39	8.97% 14	156
Recreation programs for teens	20.65% 32	43.87% 68	25.81% 40	9.68% 15	155
Mountain bike trails	14.84% 23	30.97% 48	45.81% 71	8.39% 13	155
Community garden	14.10% 22	36.54% 57	40.38% 63	8.97% 14	156
Ice skating rink	10.19% 16	16.56% 26	66.88% 105	6.37% 10	157
Baseball, basketball &/or soccer playing fields	9.62% 15	30.13% 47	53.85% 84	6.41% 10	156
Tennis courts	7.10% 11	11.61% 18	74.19% 115	7.10% 11	155
Horseback riding trails	3.33% 5	21.33% 32	64.67% 97	10.67% 16	150
Snowmobile trails	2.00% 3	9.33% 14	83.33% 125	5.33% 8	150

Q9: How often do you use the following open space and recreational resources in town?

Answered: 169 Skipped: 17



	OFTEN	OCCASIONALLY	NEVER	I DON'T KNOW ABOUT THIS RESOURCE	TOTAL
Trails on public lands	55.28% 89	37.89% 61	6.21% 10	0.62% 1	161
State forest land	43.40% 69	45.28% 72	7.55% 12	3.77% 6	159
Abandoned/discontinued roads	40.49% 66	42.94% 70	9.20% 15	7.36% 12	163
Quabbin Reservoir land	35.76% 59	49.09% 81	12.73% 21	2.42% 4	165
New England Trail (M&M Trail)	27.11% 45	45.18% 75	19.28% 32	8.43% 14	166
Trails on private lands	27.78% 45	39.51% 64	22.22% 36	10.49% 17	162
Lake Wyola State Park beach	26.19% 44	49.40% 83	24.40% 41	0.00% 0	168
Atkins Reservoir land	22.70% 37	35.58% 58	33.74% 55	7.98% 13	163
Lake Wyola State Park fields, forest & trails	17.79% 29	51.53% 84	25.77% 42	4.91% 8	163
South Brook Conservation Area	14.63% 24	28.05% 46	32.32% 53	25.00% 41	164
Public boat launch	13.29% 21	42.41% 67	43.67% 69	0.63% 1	158
Elementary School playground & fields	13.04% 21	26.71% 43	58.39% 94	1.86% 3	161
Julian's Bower (Kestrel Land Trust)	11.18% 18	24.22% 39	31.06% 50	33.54% 54	161
Lake Wyola Association beaches (private)	10.56% 17	15.53% 25	66.46% 107	7.45% 12	161
Shutesbury Town Beach/Elliot Park	9.20% 15	41.72% 68	33.74% 55	15.34% 25	163
Town Common	7.36% 12	55.83% 91	36.20% 59	0.61% 1	163
Powerline rights-of-way (private)	5.63% 9	30.63% 49	51.88% 83	11.88% 19	160
Elementary School track	4.91% 8	22.70% 37	69.33% 113	3.07% 5	163
Field behind Town Hall	4.35% 7	21.74% 35	65.22% 105	8.70% 14	161
Field behind Fire Station	2.50% 4	10.63% 17	73.75% 118	13.13% 21	160

Q10: Is access a concern or an impediment in any of the recreation areas listed in Question 9? If so, please explain.

85 responses

9 mentioned wanting more info such as: resource guide, trail map, better marked trails, knowing which trails are ok to use

6 mentioned Cowl's property, expressing concerns about continued access

3 mentioned concerns about development

3 mentioned wanting more Lake access

3 mentioned wanting to bring dogs on trails where they are not allowed

2 mentioned handicap accessible trails

2 mentioned Atkins Reservoir – 1 wanted more use, 1 wanted less use

Specific suggestions: better parking at Jones working forest, parking in general

Q11: Is there a specific recreational area or facility that you would like to see Shutesbury develop or improve?

106 responses

17 - Library

12 - trails - e.g., trails like Leverett, better maintained trails, maps, marked trails, trails on land not owned by Cowls, easements to trails on Cowls

12 - recreational infrastructure (3 sports/recreational facility + 4 tennis + 5 playground not at SES)

7 - Lake Wyola – 4 mentioned improving boat launch, better lake access for residents, control motorboat speed)

5 - community garden

4 - sidewalk

4 - community center

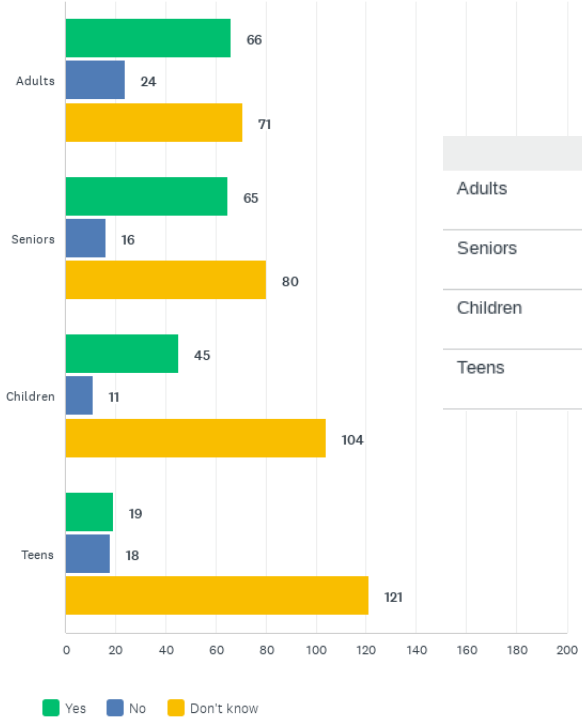
2 - keep it wild

15 - NO

Specific comments: now that Shutesbury is state approved 'Complete Streets Community' create walking path from SES to new library (https://www.mass.gov/complete-streets-funding-program)

Q12: Are you satisfied with the program offerings available in town? Please indicate for each age group.

Answered: 165 Skipped: 21



	YES	NO	DON'T KNOW	TOTAL
Adults	40.99% 66	14.91% 24	44.10% 71	161
Seniors	40.37% 65	9.94% 16	49.69% 80	161
Children	28.13% 45	6.88% 11	65.00% 104	160
Teens	12.03% 19	11.39% 18	76.58% 121	158

Q13: Is there a specific recreation program(s) that you would like to see Shutesbury develop or improve?

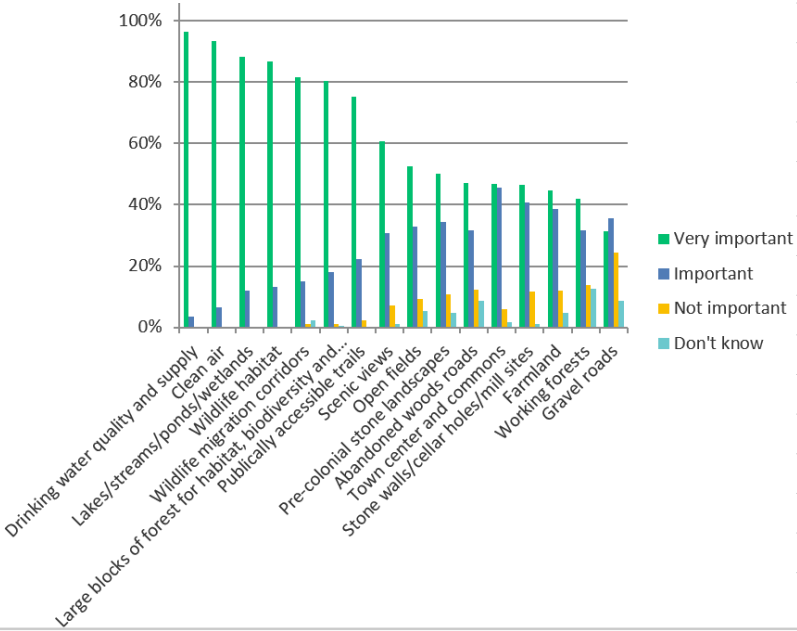
68 responses

7 - trails: more hiking trails, trail maintenance, trail map
5 - hikes: group hikes, hiking club
4 - nature: programs, nature walks
4 - community garden
4 - swim lessons
3 - sports, recreation, team sports, exercise classes
13 - NO

Specific comments: nearby towns are building trails and protecting access, there is no community recreation/center for anyone

Q14: Open space in this survey refers to undeveloped land (fields, forests and wetlands, etc.) with particular conservation, recreation, or scenic interest. These can be public or privately owned. How important is it to you to conserve these natural and scenic resources?

Answered: 168 Skipped: 18



	VERY IMPORTANT	IMPORTANT	NOT IMPORTANT	DON'T KNOW	TOTAL
Drinking water quality and supply	96.43% 162	3.57% 6	0.00% 0	0.00% 0	168
Clean air	93.45% 157	6.55% 11	0.00% 0	0.00% 0	168
Lakes/streams/ponds/wetlands	88.10% 148	11.90% 20	0.00% 0	0.00% 0	168
Wildlife habitat	86.83% 145	13.17% 22	0.00% 0	0.00% 0	167
Wildlife migration corridors	81.55% 137	14.88% 25	1.19% 2	2.38% 4	168
Large blocks of forest for habitat, biodiversity and mitigating climate change	80.24% 134	17.96% 30	1.20% 2	0.60% 1	167
Publically accessible trails	75.30% 125	22.29% 37	2.41% 4	0.00% 0	166
Scenic views	60.84% 101	30.72% 51	7.23% 12	1.20% 2	166
Open fields	52.44% 86	32.93% 54	9.15% 15	5.49% 9	164
Pre-colonial stone landscapes	50.00% 83	34.34% 57	10.84% 18	4.82% 8	166
Town center and commons	46.71% 78	45.51% 76	5.99% 10	1.80% 3	167
Abandoned woods roads	47.20% 76	31.68% 51	12.42% 20	8.70% 14	161
Stone walls/cellar holes/mill sites	46.34% 76	40.85% 67	11.59% 19	1.22% 2	164
Farmland	44.58% 74	38.55% 64	12.05% 20	4.82% 8	166
Working forests	41.82% 69	31.52% 52	13.94% 23	12.73% 21	165
Gravel roads	31.29% 51	35.58% 58	24.54% 40	8.59% 14	163

Q15: Shutesbury has a number of historic sites, such as the Lake Wyola Dam, stonewalls, old cellar holes, old mill remnants, and suspected pre-colonial ceremonial stone landscapes. Are there specific historic/archaeological areas in Shutesbury you value that you think the Town should try to acquire, protect access to, or otherwise protect?

85 responses

21 indicated they didn't know about local historic sites. Of those, half said they'd like to know more

8 indicated they didn't think the town should protect in any way.

18 were interested in protecting post-colonial sites

12 were interested in protecting pre-colonial sites; of these, many mentioned ceremonial stone landscapes, some mentioned keeping solar farms out of these

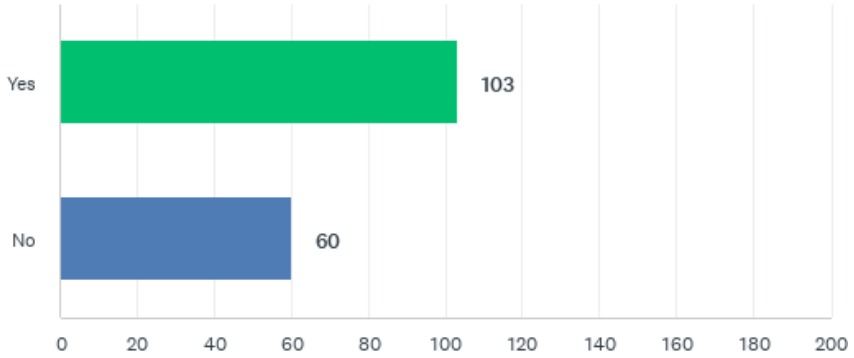
5 were interested in protecting all sites

Specific locations mentioned were:

Cascades off Sandhill Rd
Highpoint off Carver Road
Monks Caves on Montague RD
Old Schoolhouse of Baker Rd
Adams Tomb
Lake Wyola Dam
Old foundations, stone walls and cellar holes
Restore old Town Hall to a usable condition
Town Farm, Town Pound
Jewish Cemetery
Pre-ceremonial stone sites

Q16: Have you increased your use or enjoyment of any open space or recreational opportunities in Shutesbury as a result of the COVID-19 pandemic?

Answered: 163 Skipped: 23



Q17: What open spaces in Shutesbury have you used more since the beginning of the pandemic?

110 responses

29 - Trails
11 - Lake Wyola & LW Park
9 - Near my home
9 - Quabbin
9 - No change
6 - Woods
6 - All of them

Q18: Over the past few years, the Town of Shutesbury has brought yoga and strength classes, hikes, and other programs to town residents and built a track at the elementary school. The Top of the Lake Park with kayak/canoe launch will be completed this spring and a community garden is in the planning stages. Is there an open space or recreation project(s) you think that the Town should prioritize next?

96 responses

8 - library
8 - develop plan for recreational trails
5 - protect from dev
5 - protect from solar development
5 - tennis court
4 - better information/advertising of existing opportunities
4 - create playground
3 - access to trails
3 - sidewalks - SES to Town Hall, walking paths along significant roads in town
3 - skating rink
2 - mountain bike trails
2 - community meeting room
2 - community garden
2 - create park
8 - don't know

Specific suggestions: place to keep kayaks at Lake Wyola, public boat ramp improvements, continue yoga & strength classes

APPENDIX E

AGENDAS, SIGN-IN SHEETS & PUBLICITY