NORTHFIELD OPEN SPACE AND RECREATION PLAN

2021 – 2028

FINAL DRAFT

Prepared by the Northfield Open Space Committee

with assistance from the

Franklin Regional Council of Governments

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TOWN OF NORTHFIELD

OPEN SPACE AND RECREATION PLAN

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SECTION 1

PLAN SUMMARY

The Northfield Open Space and Recreation Plan (OSRP) focuses the interest and motivation of community members towards the maintenance and promotion of existing recreational resources and the identification and protection of Northfield's natural, recreational, and historical resources. The OSRP acknowledges the balance between conservation and economic development, and how these work together to promote the long-term vitality of the town. The OSRP's purpose is to provide a framework for decisions dealing with land uses that may impact valuable natural resources and the lands that contain unique historical, recreational, scenic, and wildlife habitat values.

The 2020 Northfield Open Space and Recreation Plan (OSRP) represents the understanding of Northfield residents of the interdependence of forests, streams, swamps, wetlands, agricultural fields, scenic views, and significant historical structures and landscapes with the town's rural character. The OSRP illustrates the roles of open spaces in a township: public recreational amenities provide safe spaces to recreate, and undeveloped areas provide wildlife habitat and ensure that residents have access to forests and fields to walk, hike, and view nature.

The Seven-Year Action Plan (Section 9) gives concrete substance to the goals and objectives that were developed from the results of the 2019 Open Space and Recreation Survey and from community members' understanding of and input regarding their Town's natural resource base. Within the overarching goal of strengthening resiliency to climate change, the 2020 Northfield Open Space and Recreation Plan prioritizes actions that will:

- Preserve the rural character of the town;
- Protect and preserve natural resources in preparation for a changing climate;
- Improve and maintain public education related to open space; and
- Promote wide recreational usage of Northfield's natural resources.

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 Northfield. This plan brings together and builds upon the planning efforts of the past several decades, and includes the 2014 Northfield Master Plan and previous Open Space and Recreation Plans (OSRP) that have been periodically completed by the town through the years. This 2020 OSRP update primarily builds on the most recent 2013 OSRP.

While this 2020 OSRP is based on the 2013 OSRP, 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 detailed Seven-Year Action Plan provides a step-by-step guide that, when carried out by an Open Space Planning Committee and other town boards and commissions, will successfully implement the town's open space and recreation goals and objectives.

Since the 2013 OSRP, the Town of Northfield has worked to implement some of the Plan's recommendations, including OS1.1- Recognizing outstanding citizen stewards; OS1.5- Encouraging residents to participate in the Keystone forest management program; OS2.1- Discussing conservation goals with area land trusts; OS2.2- Bringing land trust representatives to Northfield with programs; OS 2.4- work with the Planning Board on zoning bylaws; OS2.7- Help coordinate the response to the First Light Power relicensing project; OS3.3- prepared projects for CPA funding; OS4.1-2 Identify and promote conservation priorities; R 2.2-6 helped form and inform an ad hoc Community Park Committee to explore the possibility of creating a park; R3.2- Develop a printed Northfield Trail Guide; R3.3- trail maps online; R3.4 Trailhead signage and kiosks; R3.5 Coordinated hikes; R3.6 Needs assessment of trails; R3.7 Creation of new trails; R 3.8- Work with Highway Department on trailhead parking. In particular, we are pleased to have been able to work with many partners toward the permanent protection of approximately 1300 acres, which DCR now holds as new State Forest land as of 2016—this was land highlighted on our Greenprint plan. Additionally, our work repairing, mapping, interpreting, and publicizing our trail system has been extensive and has helped many residents and visitors discover new favorite places to hike. In 2018 we were able to use CPA funding to contribute toward a new conservation area, and our partner, the Mount Grace Land Conservation Trust, helped us built the first accessible trail in town.

B. PLANNING PROCESS AND PUBLIC PARTICIPATION

An Open Space and Recreation Survey was developed and reviewed by the Open Space

Committee. A survey was made available to residents in town in the Spring of 2019 on the town website and as an announcement on the Northfield "Nextdoor" social media site. The survey was also distributed in town committees mailboxes and by Every Door Direct Mailing to every residence on the town street list. Residents could respond via online or by paper copy. Paper copies were placed at the Library and Town Hall. A total of 239 completed surveys were returned timely, with an additional 16 surveys that were returned well after our deadline; comments from those late surveys were recorded and can be found in the Appendix, but their multiple-choice responses were not tabulated. The results were used to inform discussions by the Open Space Planning Committee in its development of Sections: 6 – Community Goals, 7 – Analysis of Needs, and 8 – Goals and Objectives.

There have been 21 public meetings of the Northfield Open Space Planning Committee, including the Public Forum, scheduled to be held on February 10, 2021. The following boards and commissions were represented on the Open Space Planning Committee or contributed to certain sections of the OSRP:

- Conservation Commission
- Historical Commission
- Community Park Committee
- Community Preservation Committee
- Planning Board

The Franklin Regional Council of Governments (FRCOG) provided assistance to Northfield in updating the Plan by coordinating meetings, producing maps, and writing sections of the Plan based on input received at the Open Space Committee meetings, via the survey, and at the Public Forum. The schedule of regular working meetings was posted at Town Hall and on the Town's website. Before each meeting, members were sent drafts of sections of the Plan to read. The draft chapters were also posted on the Town's website for public review. This form of work review was a significant and consistent vehicle for public participation in the development of the OSRP. Comments on these sections were discussed at the meetings and incorporated into the revised versions of the chapters.

Any comments expressed at the Public Forum were recorded and included in Section 10 – Public Comments. Any ideas, comments, and corrections pertaining to different sections of the Plan and the action steps have also been included in the final version of the Northfield Open Space and Recreation Plan. As part of additional public outreach, the draft Plan was posted on the Town of Northfield's website and made available at the Library and Town Hall to obtain further feedback from the community, especially for those residents who were not able to attend the Public Forum.

The Town of Northfield does not have any Environmental Justice populations or a significant population of non-English speaking residents. As a result, the survey and outreach materials were not translated and enhanced outreach was not conducted.

SECTION 3

COMMUNITY SETTING

The Town of Northfield contains rural landscapes that have been established, developed, and affected by its human inhabitants over the past several hundred years. Planning for open space in Northfield must account for the complex relationships between people and the open spaces and natural resources upon which they depend. Continued growth without consideration of the natural systems needing protection, such as drinking water supplies, will reduce the quality of life for future generations.

The information provided in this section 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. *Regional Context* gives a snapshot of Northfield today, and identifies the ways in which the town's location in the region has affected its growth and quality of open space and recreational resources. *History of the Community* looks at the manner in which the human inhabitants settled and developed the landscapes in Northfield. Next, using statistical information and analysis, *Population Characteristics* shows the reader who the people of Northfield are today and how population and economic trends may affect the town in the future. Finally, *Growth and Development Patterns* describes specifically how the Town of Northfield has developed over time and the potential future impacts that the current zoning may have on open space, drinking water supplies, and municipal services.

A. REGIONAL CONTEXT

Regional Context concentrates on the location of the Town of Northfield relative to natural and socio-economic resources as well as conditions shared by communities in the region. It describes the significant influence a town's physical location can have on its characteristics, including the quality and quantity of open space in the town as well as its recreational resources. Regional Context also considers the impact that different land uses, located within Northfield and surrounding communities, have on regional open space and recreational resources.

The Town of Northfield is located in northwestern Massachusetts, in north central Franklin County. It lies on both sides of the Connecticut River and is the only community along the entire length of the river to do so. Northfield is bordered by Vernon, Vermont, and Hinsdale and Winchester, New Hampshire on the north; Bernardston and Gill on the west; Erving on the south; and Warwick on the east.

Regional Sustainability Plan Context

In 2013, *Sustainable Franklin County: Franklin County's Regional Plan for Sustainable Development* (RPSD) was completed by the Sustainable Communities Consortium including Community Action, Franklin County Regional Housing and Redevelopment Authority (HRA), North Quabbin Community Coalition (NQCC), Franklin County Community Development Corporation (FCCDC), and the City of Greenfield, and the Towns of Deerfield, Montague, and

Orange. 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 and constraints, goals, and 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 forested lands, 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 large lot zoning in many towns, which 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 less common than ANR development, are also often located outside of existing town centers, further fragmenting the land and converting green spaces to development.

Natural Resources Context

In order to plan for the protection of open space and natural resources in the Town of Northfield, residents should consider the role natural resources play across the region. Two regional landscape-level natural resources important in both Northfield and in surrounding communities are abundant and contiguous forestland and watersheds. The presence and relatedness of these significant resources present both opportunities and challenges to open space and recreation planning.

Large Blocks of Contiguous Forestland

Forests represent 74 percent of land cover in the Town of Northfield and constitute one of the most important natural resources in the town and broader region. Forestland conserves water supplies by sustaining the soils' ability to absorb precipitation and recharge ground and surface waters slowly. Woodlands and their changing foliage give residents gorgeous surroundings upon which to gaze and appreciate. Forests clean the air and provide cool air currents in warm months.

Large blocks of contiguous forestland are important regional resources for several reasons. Wildlife species that require a certain amount of deep forest cover tend to migrate out of fragmenting landscapes. New ANR lots and subdivisions can often result in a widening of human

activity, an increase in the populations of plants and animals that thrive alongside humans (i.e. raccoons and squirrels) and a reduction in the species that have larger home ranges and unique habitat needs.

Northfield, like other towns with lands upslope from the Connecticut River Valley, still contains many areas where the forests stretch to include thousands of acres that are not fragmented by development. Much of the Northfield forest is contiguous to other forests in Erving and Warwick.

The northwestern corner of Northfield, across the Connecticut River in Satan's Kingdom contains a 5,000 to 10,000-acre block of forestland, which stretches west into Bernardston and north into Vernon, VT. The eastern half of town slopes towards the ridgeline of mountains called the Notch, Great Hemlock, Stratton, Brush, and Crag. Several blocks of contiguous forest, 1,000 to 3,000 acres in size surround a 5,000-10,000 acre block that includes the Northfield State Forest, Warwick State Forest and Erving State Forest. These other forests are closely linked to other large blocks of forest west to the Connecticut River and south to the Quabbin Reservation, a 60,000-acre area of protected lands surrounding the reservoir.

Two recent studies evaluated the forestland in Massachusetts. In 2014, 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 and produces the least decline in forest habitat quality. Under this scenario, accelerated land conservation targeted to areas of priority habitat would protect more than half a million acres of priority habitat by 2060. The plan suggests that widespread adoption of "improvement forestry" would maintain critical forest benefits while increasing local wood production. To achieve the full benefit of land protection, Harvard Forest has consistently advocated for 10% of forest lands to be set aside in wild reserves that are permanently protected from all harvesting.[2] Realizing this vision locally can have important additive effects for every land conservation goal stated previously. 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.

Finally, the study found that the loss of forests to development has more immediate and pronounced impacts on carbon storage and water quality than gradual forest changes associated with climate change. The report 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 are that there is much to gain by conserving forests and managing them well by:

[1] http://harvardforest.fas.harvard.edu/changes-to-the-land.
[2] https://harvardforest.fas.harvard.edu/news/wildlands-and-woodlands-vision-new-england-landscape

- ❖ Recommitting to land conservation, including preserving a proportion of wildlands held as "forever wild";
- ❖ Redoubling land-use policy and smart-growth efforts[3] 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.

The 2017, *Wildlands and Woodlands Farmlands and Communities: broadening the vision for New England*, also published by Harvard Forest, continues a balanced approach to conservation and preservation with some of the land in New England in wildland preserves.

Watersheds

Watersheds are the areas of land that drain to a common outlet, such as a lake, stream or river. Sub-watersheds contain first and second order stream tributaries. These are the most extensive component of any watershed. They are also the most sensitive to land use, both the negative impacts of runoff and the positive effects of forest cover. Two of the most important things that result from protecting forestland are maintaining the long-term integrity of wildlife habitats and protecting water quality within the watershed's surface and ground waters. Northfield is contained within the watersheds of the Connecticut River and Millers River.

The Connecticut River Watershed is the largest river ecosystem in New England and spans four states, including Vermont, New Hampshire, Massachusetts, and Connecticut. The Connecticut River forms the border between Northfield and the Town of Gill to the west. The northern half of Northfield contains land on both sides of the river. Many brooks and streams in both the eastern and western portions of Northfield flow through the town on their way to the Connecticut River. From its beginnings on the Canadian border to its end in Long Island Sound, the Connecticut River drains a landscape that is 11,000 square miles in size, 410 miles long. The river drops 2,400 feet from its source to the sea and is one of the most dammed rivers in the county. It enters Massachusetts through the Town of Northfield and flows through 45 communities before entering the State of Connecticut. The watershed is eighty percent forested, twelve percent agricultural, three percent developed, and five percent wetlands and surface waters.

The Connecticut River Watershed was designated the "Silvio O. Conte National Fish and Wildlife Refuge" by an act of Congress in 1991, the first refuge of its kind, encompassing an entire watershed ecosystem. The Connecticut River also received special attention in 1998 when it became one of only fourteen rivers in the U.S. designated as a National Heritage River. The Massachusetts Executive Office of Energy and Environmental Affairs has outlined watershed priorities for the Connecticut River which include: promoting and/or creation of riparian buffer zones along the waterways within the watershed; reducing barriers to migratory fish passages; reducing the negative effects of non-point source pollution, primarily storm run-off; and increasing the amount of water quality data available within the watershed.

[3] 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/.

The Millers River Watershed is located in north central Massachusetts and southwestern New Hampshire, and includes the southeastern corner of the Town of Northfield. Jacks Brook and Keyup Brook originate in Northfield and flow in a generally southerly direction before entering the Millers River in the Town of Erving. The Millers River Watershed is bordered on the east by the Nashua River Watershed, on the west by the Connecticut River Watershed, and on the south by the Chicopee River Watershed. From its origin in New Hampshire, the Millers River flows south, then gradually west flowing into the Connecticut River. The Millers River drains a regional landscape that is 392 square miles in size, 320 of which are in Massachusetts (DEP; 1995). The total river length is fifty-one miles, forty-four of which are in Massachusetts. Although the Millers River fluctuates between sluggish and rapid flows there is an average drop of twenty-two feet per mile. This feature has made the Millers River and its main tributaries a magnet for manufacturing and hydroelectric power generation, which provided the impetus for the initiation of industrial activities in the late 1700s.

Socio-economic context

The Town of Northfield has been an agricultural community well before the 1700s. Native Americans farmed the rich soils along the Connecticut River and early European settlers continued to do so. During the mid-1800s, Northfield was ranked second in the county (Deerfield was ranked first) for number of acres planted in broom corn and hop crops. Northfield's hop crops were valued at twice that of all other such crops in Franklin County. In 1886, the Northfield Mount Hermon farm started with 25 sheep & lambs, 8 cows and 75 chickens. By 1925, it housed 175 animals. They had a prize winning dairy herd for 50 years. In 1986, six of Northfield's fourteen full-time farms were dairy farms. In the late 1980s and 1990s, Northfield experienced a reduction in the number of dairy farms due to a federal buy-out program of dairy herds to control pricing. Northfield's farming trends in recent decades resemble that of the greater Pioneer Valley, with an increase in diversified farming and markets for fresh local food and a shift away from dairy farming and commodity agriculture.

The dominant economy in town was education since the late 1800s with the opening of the Northfield Mount Hermon School (NMH). However, due to several factors including increasing costs, competition from other schools, and the declining demographic of high school students, NMH consolidated its Northfield and Gill campuses into the Gill campus and sold the Northfield campus to Hobby Lobby, Inc., in 2009. The campus is now occupied by the Moody Center, recently-opened Thomas Aquinas College, and the C. S. Lewis Study Center.

Few of Northfield's residents work in town, which is consistent with a statewide trend towards longer commuter travel times as fewer residents find work in their town of residence. At the same time, income levels among residents are running above that of Franklin County while the town's unemployment rate has been lower than the state and national average since the 1990s. Northfield residents have largely overcome the loss of in-town employment by finding work elsewhere.

New housing starts in Northfield increased after 1990, putting development pressure on the town's open spaces, particularly in the outlying areas. Between 1998 and 2005, there were 2-16 houses built per year, which reflects the "housing bubble" seen nationally during that period. Home construction declined after 2007, with 2 or fewer house built per year, which also reflects the national trends during the Great Recession. In 2017, the community took action to conserve

vulnerable and important natural, open space, and recreation resources in advance of development by comprehensively updating the town's zoning and bylaws to carefully regulate where and how new housing development can occur in the town (See *D.3 Long-Term Development Patterns* in this Section).

Poverty is known to create barriers to access to health services, quality education, healthy food, housing, and other basic needs and opportunities and to contribute to poor health status generally. The estimated 2017 median household income in Northfield of $69,028 was higher than the county ($57,307) and less than the state ($74,167).[4] Northfield's 4 percent poverty rate is low compared to that of the county (10.9%) and the state (11%). However, poverty is still a challenge for some Northfield residents. Poverty is determined by annual income based on the size of a household and the number of children within the household. According to the U.S. Census Bureau, the poverty threshold for a one-person household in 2019 was $12,490. The poverty threshold for a four person household with two children under 18 years was $25,465.

In 2008, Governor Patrick released a Call to Action, which documents the extent of the obesity epidemic in Massachusetts, its consequences, and efforts to tackle it. To help address this significant public health problem, the Massachusetts Department of Public Health launched the Mass in Motion (MiM) statewide initiative in January 2009. The initiative includes technical assistance to cities and towns to help them build policies, systems and environments that promote wellness and healthy living. Mass in Motion emphasizes the link between how a community is designed, including access to parks, healthy food, and transportation options, and public health. Mass in Motion focuses on helping cities and towns design healthier communities by providing technical assistance on:

- Conducting Health Impact Assessments (HIAs) to understand how community projects, plans, or policies can affect us and our health
- Following "Complete Streets" policies that make roads safe and enjoyable for all users by installing safe bike lanes, bike racks, easy-to-follow signage, and safe crosswalks
- Preserving open space and developing recreational space and community centers where people can gather and socialize
- Improving and cleaning up existing green space and parks
- Identifying ways to improve access to healthy food for all residents
- Understanding health equity and how race impacts health

Technical assistance through Mass in Motion Franklin County is available to the Town of Northfield and participation by town officials on Mass in Motion Franklin County's Steering Committee is welcome. Mass in Motion Franklin County is particularly focused on Farm to School work (increasing the use of locally grown and produced foods in school cafeterias); supporting Towns' efforts to include all residents' voices in Complete Streets planning, including those traditionally not present at public meetings; and supporting Age-friendly planning efforts.

[4] Source: U.S. Census - 2017 American Community Survey (ACS) Five-year Estimates

One recent project that increased recreational access in Northfield is the Gunnery Sergeant Jeffrey S. Ames Accessible Nature Trail.[5] Through a partnership between Mount Grace Land Conservation Trust and a Northfield family, a universally accessible loop trail was built at Mount Grace's Alderbrook Meadows Wildlife Sanctuary in 2018. The trail provides universal access through a grove of white pines and to an observation deck that overlooks a hidden pond. In 2016, Northfield hosted a regional training on how to do walkability assessments, which provided tools to assess the viability of roads for pedestrian use.

In 2013, the Massachusetts Department of Transportation (MassDOT) issued the Healthy Transportation Policy Directive, ensuring that all Mass DOT projects are designed and implemented in a way that provides for safe and healthy transportation options for the public, including walking, biking, and transit. The policy is a result of the Healthy Transportation Compact, a requirement of the 2009 transportation reform legislation. The compact is an inter-agency initiative between state transportation, public health, energy and environment, and housing and economic development agencies, designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities.

In 2015, Mass DOT launched the Complete Streets program, which encourages communities to adopt a Complete Streets policy. Adopting a policy commits towns to work to integrate the needs of all users of the public right of way into street and roadway projects. An objective of the Complete Streets program is to "facilitate better pedestrian, bicycle, and transit travel for users of all ages and abilities by addressing critical gaps in pedestrian, bicycle, and transit infrastructure, and safety." Northfield is currently participating in the program and working with the Franklin Regional Council of Governments (FRCOG) to develop a state-approved policy and a prioritized list of projects to become eligible for construction funding up to $400,000 for FY 2020. One challenge for the Town of Northfield is the lack of sidewalks or bike lanes to facilitate pedestrian safety beyond the immediate downtown area. Mount Herman Station Road, Maple Street, East Street, and School Street are examples of rural roads in town that are popular for walking and biking but lack dedicated pedestrian or bicycle lanes.

Northfield's historic Schell Memorial Bridge, closed by the Town in 1988, crosses the Connecticut River. Despite a decade of effort by Friends of the Schell Bridge, the Town was not able to save this historic 1903 bridge. However, the bridge is on the 2021 Federal Transportation Improvement Program (TIP) list and Mass DOT is now planning to replace the bridge with a bicycle and pedestrian bridge that will link bicycle trails throughout New Hampshire, Vermont and the Pioneer Valley. Construction is expected to begin in 2021. The Town and state will be challenged to provide safe bike routes to and from the new bridge.

In planning for the protection of open space and natural resources and the provision of recreational opportunities in the Town of Northfield, residents will need to continue their efforts to take advantage of the positive role natural resources play in their community and across the region. Northfield's landscape encompasses scenic farmland, rolling hills and meadows, and vast uplands of contiguous mature forests of mixed hardwoods, hemlocks and pines.

[5] https://www.mountgrace.org/accessible-nature-trail-first-northfield

Its seventy-seven miles of country roads, both paved and dirt, are generally lined with sheltering trees and some are bordered with stone walls that remain along the edges of farm fields and pastures. As is the case throughout the region, most of the existing farms are part-time operations that grow hay for horses or raise horses, beef cattle, or sheep and goats. While owners also work off the farm to increase their income and to receive benefits, several farms are full-time operations that grow wheat, hops, potatoes, squash, corn, pumpkins, peppers, and sod; some farms rotate crops such potatoes, corn, peppers, and pumpkins. Examples of significant minor crops include maple syrup and honey.

Much of the agricultural land is located along the Connecticut River, which traverses the town from north to south. Several large freshwater tributaries drain to the river from the uplands to the east and provide important aquatic and riparian habitat. Northfield has a wealth of special natural features, including wildlife management areas, Town and State forests, scattered wetlands and reservoirs, and a variety of parks and access points for boating, camping, hiking, picnicking, and other forms of recreation. These characteristic landscapes are discussed in detail in Chapter 4, Environmental Inventory and Analysis. The presence and relatedness of these significant resources present both opportunities and challenges to open space and recreation planning for Northfield. In addition, these landscapes have shaped the historical development of Northfield and the surrounding region.

Beaver pond at Alderbrook Meadows Wildlife Sanctuary *(Julia Blyth)*

B. HISTORY OF THE COMMUNITY

INTRODUCTION

The Town of Northfield was established in 1723, but the history of the area is rich and deep. The mountains, the lowlands, the proximity to the Connecticut River, its streams and forests, all shaped the history over thousands of years. Most of its cultural resources have yet to be discovered and because of its relatively sparse development, Northfield was designated by the Massachusetts Historical Commission as one of the most promising sites for archaeological investigation.

HISTORY OF THE COMMUNITY Beginnings prior to 1723

Archaeological research shows Indigenous people were resident in what is now Northfield for 12,000 years prior to the arrival of colonists. Between the Hudson River and the Connecticut River valleys was a major paleo game corridor where Indigenous people followed the annual migratory routes of plentiful elk and caribou (herds estimated to be 600-800,000).

Native communities — likely associated with the northern boundary of the Pocumtucks of the Middle Connecticut River Valley and the Abenaki / Sokoki — also took advantage of the large tracts of agricultural lands along the Connecticut River, fished the river and its tributaries, and hunted in the lowlands and forests. Upland deposits of surface quartz were used for tool-making.

The first Colonial settlers arrived in 1673 via a major native pathway and inhabited the southernmost portion of what is now Main Street. They selected this site as their first settlement because the land had already been cleared and cultivated by its former inhabitants. Their thatched-roofed dwellings were built close to one another inside a stockade on the site of the original enclosure built by the Squakeag band resident to this area, on what is now believed to include 24 Main Street.

Land to the north of Cowas brook (now Mill Brook) belonged to the Abenaki sachem Nawlet, while land to the south belonged to Massamet, of unknown tribal origin. There exists a deed for the transfer of Nawlet's land (which was later amended to be more “fair") and a deed for some of Massamet's land being transferred, but no deed has yet been found for the transfer of the southernmost part of town.

The colonists’ initial relationship with the native inhabitants was cordial but tenuous and it deteriorated as they continued to demand exclusive use of more and more land and disrespected the burials of Indigenous people. As the northernmost settlement of Massachusetts, Northfield was settled and abandoned twice before colonists established it permanently in 1723.

During the wars, Squakeag, the Indigenous village, centered around what is now called Four Mile Brook, an outlet into the river now known as the Connecticut River. Squakeag had the distinction of being a haven for Indigenous war refugees.

Metacom (King Philip) is known to have wintered north of the village for at least one year, where Mary Rowlandson met him after her capture from Lancaster. It is believed that some of the major Indigenous decisions of the wars were made at Council Fires, located just off Millers Falls Road. Much of Squakeag's rich history is yet to be discovered.

GROWTH OF THE TOWN OF NORTHFIELD THROUGH 1700s and 1800s

Throughout the 1700s, farming of crops and livestock was the town's economic base. Industrial development, in the form of sawmills and gristmills, did occur, but on a smaller scale than neighboring towns, as Northfield's waterpower was seasonal, not year-round. Roadways were constructed to help supply necessary goods and services.
The 1800s saw the farms of Northfield expand and prosper. Just as the Connecticut River nourished early Native American (Indigenous) and English (Colonial) inhabitants with rich farm fields, it served as the region's earliest highway for the movement of people and goods. Between 1686 and 1936, seven ferries operated along the river, making Northfield a regional crossroads. In winter, farm products were transported across the frozen river on sledges to awaiting markets inside and outside the region.

Despite three attempts to settle the town, and few Colonial dwellings survived, the original town plan is still very much in evidence in today's Northfield. Northfield's center has remained relatively untouched since the early 1800's, a distinction the town owes to the Stearns family of artisan builders, whose work was as durable as it is beautiful. Residential development spread quickly to the outlying area of Northfield Farms (south of the center) and across the Connecticut River to West Northfield.

Early nineteenth century Northfield was a vital and energetic community. The archives of the Northfield Historical Society are full of programs and playbills from theatrical productions, lectures, dances, and other entertainments that took place with great frequency and enthusiasm. With prosperity also came appreciation and time for learning and self-improvement. The first Social Library was founded by a group of citizens in 1813 with composer Timothy Swan. Swan, whose hymns and secular songs were ubiquitous throughout New England, was its first librarian. In the practice of law, Northfield was considered "a focus of legal talent" in the county, and is credited with producing at least one Supreme Court justice: Benjamin Robbins Curtis. Curtis is famous for his dissent supporting the plaintiff in the high court's Dred Scott decision. President Lincoln used his dissent in drafting the Emancipation Proclamation.

SEVERAL SIGNIFICANT TRENDS BENEFITTED NORTHFIELD

Transportation and Travel

Northfield's location in the heart of New England made it a hub for the new railroads crisscrossing the region. Sitting at the confluence of the Connecticut and Millers rivers, one rail line connected Northfield to Millers Falls on the eastern side of the Connecticut River and the other primary route connected Northfield to Vernon, Vermont on the western side. This fueled the trade of farm crops and the growth of commercial farming. It also encouraged the development of food processing facilities for canning and pickling, as well as the creation of the Northfield Cooperative Creamery (on the Northfield campus).

Beginning in the 1840's, passenger trains ran from New London, Connecticut to White River Junction, Vermont, via several Western Massachusetts towns including Palmer, Amherst, Millers Falls, and Northfield. By the late 1800's, Northfield boasted four railway stations. Until

passenger rail service ceased in 1959, if you were going anywhere in New England by train, you went through Northfield.

Education and Religion

Due to the educational and religious fervor of the times, the town became home to several academies. Impressed by the sophisticated rail access and the availability of land, native son D.L. Moody and his family founded the Northfield Seminary for Young Women in 1879 and two years later, the Mount Hermon Boys School across the river in Gill. Through their efforts, Northfield became an internationally-known center for missionary training and Protestant thought and influenced the character of Northfield. The Town of Northfield enjoyed a reputation as a "school town."

Recreation and Tourism

Northfield's picturesque hills, clean air, ponds and streams, and rail service made it a popular destination for those city dwellers seeking a summer retreat from heavily industrialized urban centers like New York City. A grand hotel — The Northfield Inn — with an array of amenities and sports like golf, tennis, swimming and ice skating, drew wealthy tourists, celebrities and politicians to town, including President Theodore Roosevelt. Small scale retail and service businesses sprang up in response to the influx of tourists.

While building his grand summer home, the Chateau, Moody devotee Robert Francis Schell, donated $60,000 to the Town for the building of a pedestrian and vehicular bridge connecting passengers from the East Northfield railroad station (on the west side) to East Northfield. Completed in 1904, the Schell Memorial Bridge connected thousands of tourists to Northfield, as well as students between the two campuses of the girls and boys schools. In 1939, the American Youth Hostel movement was founded in Northfield, bringing hundreds of youth outfitted with backpacks and bicycles by rail to begin their tours of upper New England.

The development of the automobile brought a new industry to town where auto repair and even manufacturing shops and service stations dotted the landscape and touring became a popular pastime and source of visitors.

Eventually, the Town of Northfield saw the loss of most of its mills and shops to the more urban towns of Greenfield, Brattleboro, and Keene. Adding to the erosion of the town's commercial and industrial base, farming also began a serious decline. Small dairy farms were consolidated into larger commercial ones. Throughout the twentieth century, education remained the town's principal industry and employer.

Northfield was tested during the twentieth century, when the town experienced two punishing floods and the 1938 hurricane. The river, always a source of sustenance, took a huge toll on the town. The devastating effects on the community from fires and natural disasters are evident in the photographic record, reminding us how the work of generations can be destroyed in a few hours. After the disasters, however, Northfield's people responded by forming clubs, building new public schools, and coming together to celebrate important historical milestones with parades, festivals and pageants.

Town Government

At the Annual Town Meeting in May, a budget is passed, and special warrants are considered. Several town boards, committees, and individuals, including the Select Board, Board of Assessors, Board of Health, Planning Board, Recreation Commission, School Committee, Board of Library Trustees, Board of Trustees of Veterans Memorials, Constables, Sewer Commissioners, and Town Moderator, are elected in town elections that occur in May after Town Meeting. The town government is headed by a three-person Select Board (soon to be a five-member board) supported by a moderator-appointed Finance Committee, several other boards (Health, Planning, Finance, School, and Library) to which members are elected, and an empowered Town Administrator. Town officers are elected the day after the Town Meeting. Special Town Meetings are called when needed.

The Select Board makes appointments to the Agricultural Commission, Building Utilization & Planning Committee, Community Park Committee, Community Preservation Committee, Conservation Commission, Council on Aging, Cultural Council, Electronic Communication and Cable Committee, Energy Committee, Historical Commission, Open Space Committee, Stewardship Advisory Committee, and the Zoning Board of Appeals. Some seats on these committees are also appointed by other related committees. Additional short-term committees include an Emergency Services Facility Committee, H.E.A.R.T Committee (related to school sustainability), Multi-Use Business Park Exploratory Committee, Schell Bridge Advisory Committee, and Town Governance Study Committee. The high level of volunteerism on boards and committees in town government reflects citizen commitment to, and pride in, the town.

Gunnery Sergeant Jeffery S. Ames Accessible Nature Trail at Alderbrook Meadows Wildlife Sanctuary *(Julia Blyth)*

C. POPULATION CHARACTERISTICS

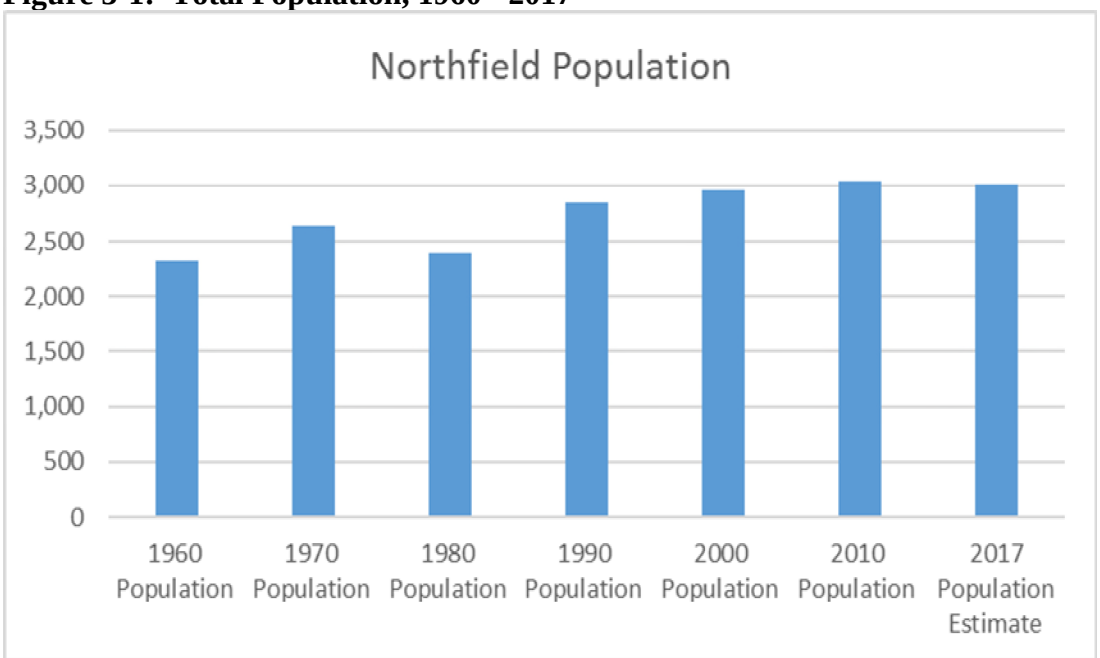
In order to identify the open space and recreation needs of the community, it is essential to know about the people who call Northfield their home. Therefore the size, age, density, income, and occupations of the population are discussed so that informed decisions may be made regarding the type, quantity, location and level of future investments in open space and recreation areas and facilities.

The demographic information includes changes in total population, changes in the relative importance of different age groups in Northfield, and measures of income. The employment statistics section covers labor force, and employment by industry sector.

Demographic Information

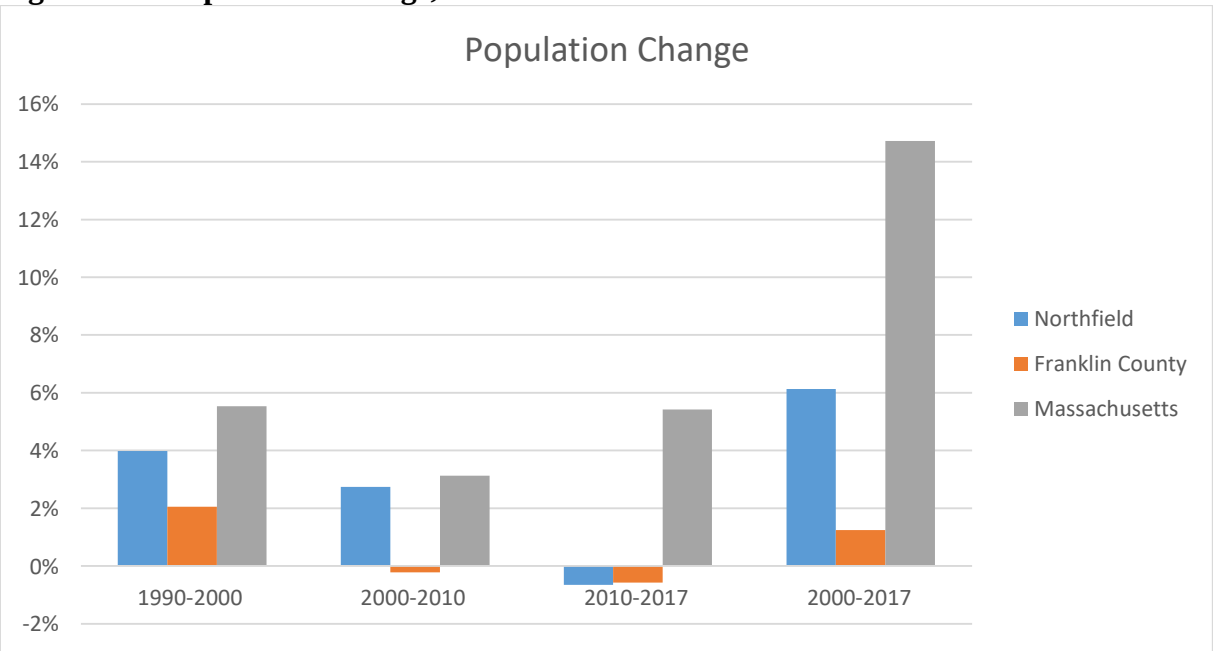
Demographics are useful for forecasting the need for open space and recreational resources that may be required by residents over time. According to the American Community Survey (ACS) Five-year Estimate, Northfield's population was estimated to be 3,023 residents in 2017 *(see Figure 3-1)*. Since the 1990s, Northfield's population growth has been more than double that of Franklin County, except during 2010-2017, when both populations decreased by 1%. The state population rate (15%) has remained consistently higher than both Northfield (6%) and Franklin County (1%) between 2000 and 2017 (*see Figure 3-2*).

Figure 3-1: Total Population, 1960 - 2017



Source: U.S. Census Bureau, Decennial Census and 2017 American Community Survey (ACS) Five-year Estimates.

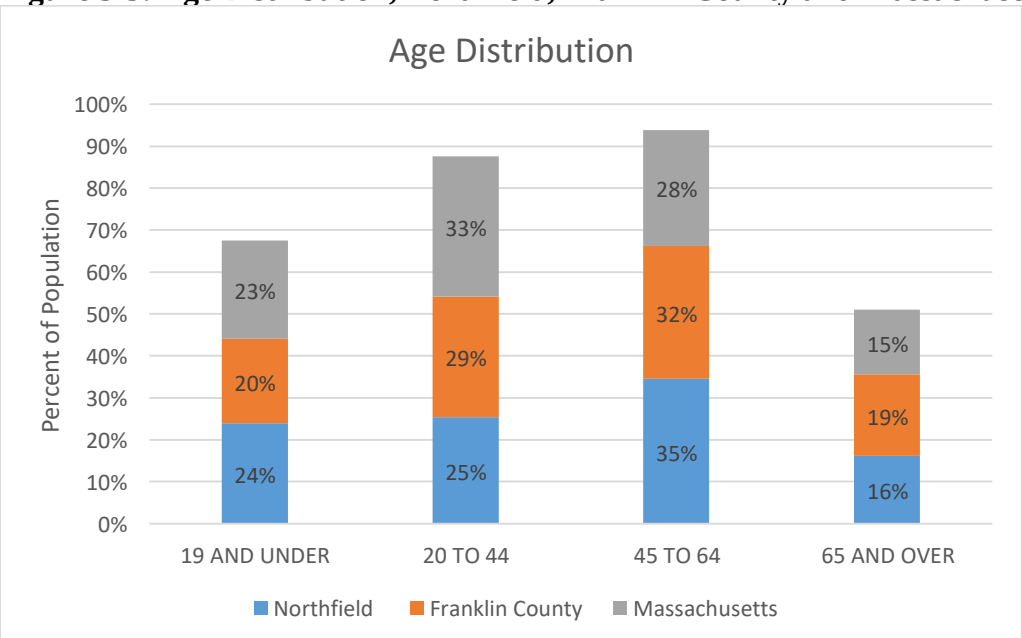
Figure 3-2: Population Change, 1990 - 2017



Source: U.S. Census Bureau, Decennial Census and 2017 American Community Survey (ACS) Five-year Estimates.

How will population growth in Northfield translate into demand for open space and recreational resources? Will additional residents be young, middle-aged, or elderly and, what would be the age distribution of the population? How might these changes in population impact demand for open space and recreational resources?

Figure 3-3: Age Distribution, Northfield, Franklin County and Massachusetts



Source: U.S. Census. 2017 American Community Survey (ACS) Five-year Estimates.

To determine how population changes in Northfield translates into demand for open space and recreational resources, it is necessary to look at the age distribution of the current and projected population. According to U.S. Census data shown in Figure 3-3, the age distribution of residents in Northfield is comparable to that of Franklin County and Massachusetts. The 20-44 age cohort has a slightly lower percentage of residents in Northfield (25%) than Franklin County (29%) and Massachusetts (33%), and the Town has a slightly larger percentage of residents age 45-64 (35%) compared with Franklin County (32%) and Massachusetts (28%).

Northfield has a relatively young population with 25 percent of its residents in the 19 and under age cohort, and 61 percent of its residents in the 20 to 64 (early working years) age cohorts (*see Figure 3-3*). Approximately 15 percent of Northfield's residents are age 65 and over.

If the relatively large (35%) cohort of older (45-64) working-aged residents were to continue to reside in Northfield, it could result in a significant population of individuals in the older age cohort in ten to twenty years. How will the Town of Northfield provide recreational facilities and services for all of its residents, especially the elderly, which may require accessible walking paths, for example? Residents of all ages will need facilities and programs that provide safe spaces for recreating as well as access to open space.

Identifying the best location for the development of new open space and recreation resources will need to take into account where the concentration of population will occur and which parts of the local citizenry require specific needs. The next section, *D. Growth and Development Patterns*, describes how future growth depends in large part on zoning, slopes, soil, groundwater, and which lands are protected from development. Town officials could identify key parcels in town that might be future parks and walking trails that are close to neighborhoods and/or areas that could be later developed for residential uses. Officials could be looking for opportunities to conserve land in Northfield that protects valuable scenic and natural resources and provides public access to trail networks and open spaces.

Whatever the generational makeup of the future community, recreation and open space needs may change over time. What would Northfield's response be to these potential increasing and changing needs? How can these services and facilities be created in an inexpensive manner for both the Town and the residents? The answers to these questions may depend in part on the current and potential economic and financial wellbeing of Northfield.

Economic Wealth of Residents and Community

Measures of the income levels of Northfield residents as compared to the county and state are helpful in assessing the ability of the citizenry to pay for recreational resources and programs and access to open space as well as assessing the town's relative resiliency to shifts in the national economy. A town with a high level of poverty and unemployment amongst its residents is assumed to be less able to deal with recessions and other shifts in the economy that typically tax a town's capacity to care for resident's open space and recreation needs.

Table 3-1: Income and Poverty

Geography	Per Capita Income Estimate	Median Household Income Estimate	Percent of Individuals Below Poverty Level*
Northfield	$33,657	$69,028	4.0%
Franklin County	$33,010	$57,307	10.9%
Massachusetts	$39,913	$74,167	11.1%

* For whom poverty status was determined.
Source: U.S. Census - 2017 American Community Survey (ACS) Five-year Estimates

Table 3-1 describes the earning power of residents in Northfield as compared to the county and the state. Northfield households earn incomes that are above the median for the county and below the median for the state. The per capita income for the town (total income for all residents divided by the total population) is also greater than the county, but less than the state. However, the poverty rate in Northfield is estimated to be 4.0%, which is significantly less than in the county and state. It appears that the financial wellbeing of Northfield residents is greater than the average for households in the county, but lower than the average for the state.

According to the American Community Survey, 78.4 percent of occupied housing units in Northfield were owner-occupied in 2017. This percentage is significantly larger than the 69% owner-occupied rate for Franklin County and 62% for the state as a whole. The average household size for these units was 2.64 persons. For renter-occupied units the average household size was 1.83. Of particular note is that 54% (540 out of 1,447) of the homes in Northfield were built since 1970.

Environmental Justice (EJ) is based on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. The Environmental Justice Executive Order No. 552 requires EEA agencies to take action in promoting environmental justice. The Executive Order requires new environmental justice strategies that promote positive impacts in environmental justice communities and focus on several environmental justice initiatives. EJ communities are defined as being low income, having a high minority population, and/or to have a high rate of English language isolation, based on the 2010 U.S. Census data.

According to MassGIS, there are no Environmental Justice populations identified in the Town of Northfield. That notwithstanding, there are concerns that as people begin migrating away from coastal areas or other places of greatest climate impact, Northfield could inadvertently become an enclave for affluent migrants, leaving little space for migrants with the greatest need, or longtime locals who might be priced out of their homes. The Town has adopted the Community Preservation Act, which could help increase availability of funds for affordable or community housing in Northfield. Low income residents can qualify for home repair funds from Franklin County Housing Authority.

Employment Statistics

Employment statistics like labor force, unemployment rates, numbers of employees, and place of employment are used to describe the local economy. Labor force figures can reflect the ability of a community to provide workers that could be employed by incoming or existing businesses.

Unemployment rates can show how well residents are faring in the larger economy while employment figures describe the number of employees in different types of businesses. Employment can be used as a measure of productivity. The number of people employed in each business can be used to determine the types of industries that should be encouraged in town. The Town may decide to encourage business development to provide services to residents, create more jobs, and as a way of increasing taxable property values, which can help pay for municipal services and facilities, including recreational parks and programming as well as protected open space.

Labor Force: Northfield residents that are able to work

The labor force is defined as the pool of individuals who are 16 years of age and over, and 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. In 2018, the Town of Northfield had a labor force of approximately 1,825 and a 2.5 percent rate of unemployment, which was lower than both Franklin County's overall rate of 3% and the Commonwealth of Massachusetts' rate of 3.3% (*see Table 3-2)*. It is also evident that Northfield's labor force figures and the number of employed in town are influenced by the greater economy similar to Franklin County and the state, as demonstrated by the highs and lows in Figure 3-4.

Table 3-2: Labor Force and Unemployment Data, 2018

Geography	Labor Force	Employed Persons	Unemployed Persons	Unemployment Rate
Northfield	1,825	1,779	46	2.5
Franklin County	41,365	40,115	1,250	3.0
Massachusetts	3,805,400	3,678,400	127,000	3.3

Source: Massachusetts Executive Office of Labor and Workforce Development, LAUS Data, 2018.

As Figure 3-4 demonstrates, Northfield's unemployment rate increased from 4.4% in 2008 to 6.7% in 2010, with the highest rates occurring in 2009 and 2010, during the economic downturn. The lowest rates have occurred within the past 5 years: 3.5% in 2015, 2.8 in 2016, 3.1% in 2017, and 2.5% in 2018. As shown in Figure 3-6, during this same time frame, Northfield's labor force remained largely constant at an average of 1,752 persons, and the number of employed persons fluctuated by 149 persons, with the lowest number of employed persons occurring in 2009 at 1,630.

Figure 3-4: Unemployment Rates in Northfield, Franklin County, and Massachusetts 2008 to 2018

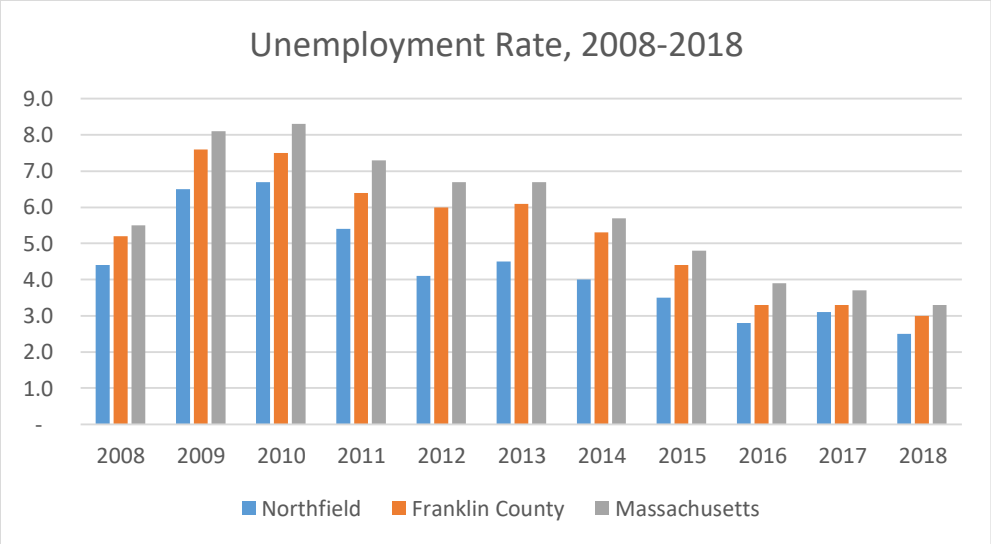
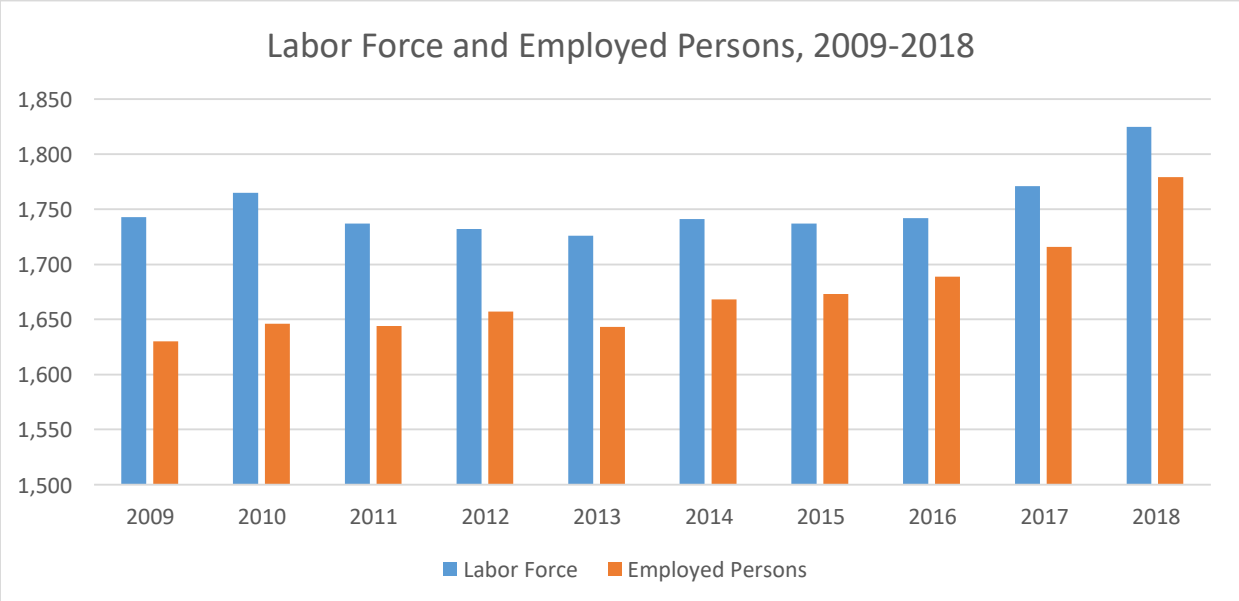


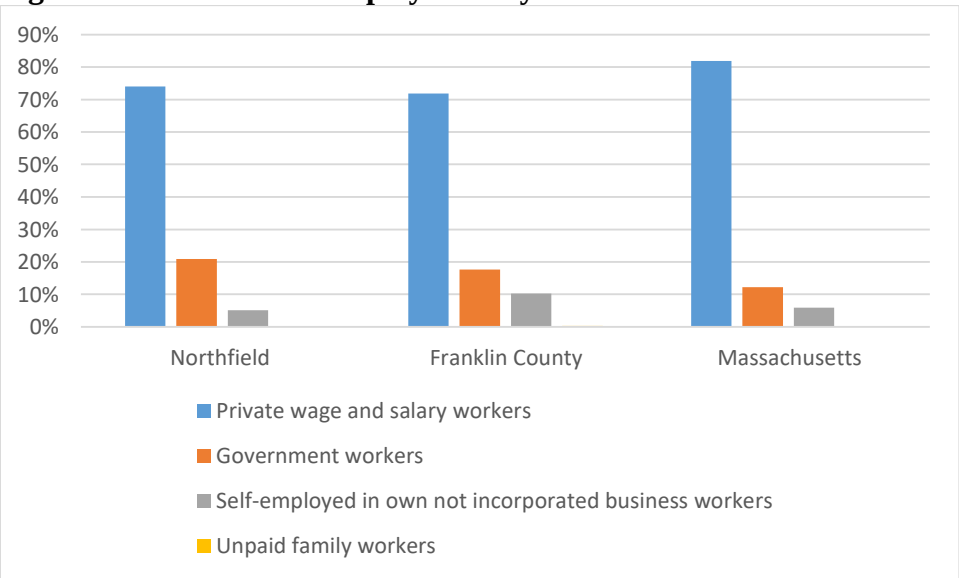
Figure 3-6: Labor Force and Employed Persons in Northfield, 2009 through 2018



Source: Massachusetts Executive Office of Labor and Workforce Development, LAUS Data, 2018.

Figure 3-7 shows the class of worker for the civilian employed population aged 16 years and over. The Town of Northfield has almost the same percentage of self-employed workers (5%) as the state (6%), whereas Franklin County has twice as many self-employed residents, at 10% of the working population. Northfield has the highest percentage of Government workers (21%) compared to Franklin County (18%) and Massachusetts (12%). Northfield's percentage of Private wage and salary workers (74%) is less than that of the state (82%) and greater than that of Franklin County (72%).

Figure 3-7: Northfield Employment by Class of Worker



Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.

According to the U.S. Census Bureau, the classes of workers shown in Figure 3-7 are defined as follows:

- "Self-employed" includes people who worked for profit or fees in their own unincorporated business, profession, or trade, or who operated a farm.
- "Government workers" includes people who were employees of any local, state, or Federal governmental unit, regardless of the activity of the particular agency. The government categories include all government workers, though government workers may work in different industries. For example, people who work in a public elementary school or city-owned bus line are coded as local government class of workers.
- "Private wage and salary workers" includes people who worked for wages, salary, commission, tips, pay-in-kind, or piece rates for a private, for-profit employer or a private not-for-profit, tax-exempt or charitable organization. Self-employed people whose business was incorporated are included with private wage and salary workers because they are paid employees of their own companies.

Employment in Northfield: People who work in town, whether residents or not

A majority of employers in Northfield (and in the county and state) could be described as being in the following three fields:

- Educational, Health & Social Services
- Manufacturing
- Retail Trade

The main differences between the type of businesses in Northfield as compared to Franklin County and the State of Massachusetts are:

- Educational, Health & Social Services businesses employ a bigger share of all employees in town than the same types of businesses in the region and in the state.

- ❖ Agriculture employs more people in town than the county and state average.
- ❖ There is a smaller contingent of professional service providers in town than what could be expected given the region and state averages.
- ❖ Both Wholesale Trade and Transportation, Warehousing & Utilities are bigger employers in town than could be expected given the region and state averages.

Employers in Northfield that employ at least ten people include: Pioneer Valley Regional School District, the Town of Northfield, Northeast Paving, Sisson Engineering, Northfield Food Mart, Whitney Trucking, First Light Power, and System, Software and Support, Inc. In addition, Northfield is home to many small businesses.

D. GROWTH AND DEVELOPMENT PATTERNS

This section of the plan provides basic data on the patterns and trends in land use and development in Northfield driven by the characteristics of the landscape and the culture that has shaped it over the years. The first subsection reviews patterns and trends in land use. The next subsection describes the existing infrastructure in Northfield and the effects it has had on development patterns. Finally, the section concludes with an analysis of long-term development patterns, including a discussion of current land use controls, currently anticipated residential and commercial developments, and their impacts on the natural and built environment.

Land Use Patterns and Trends

During the past two hundred years, Northfield residents developed their community using the productivity of the area's prime farmland and the opportunities presented with the advent of the railroad. In the 20th century, Northfield saw a reduction in the number of mills, shops, and farms, and the role of agriculture as an employer diminished in contrast to the rise of the Northfield and Mt. Hermon Schools and other schools as a source of employment for town residents. In 2005, the Northfield and Mt. Hermon School consolidated its two campuses to the Mount Hermon campus in Gill reducing employment opportunities in town.

Now, more people are finding work beyond town borders or working from home in cottage industry or online business. Northfield has grown to a population of almost three thousand residents today. Northfield is attractive to people who like open spaces, forests, and the agricultural, small-town feel. Northfield is a bedroom community as most of its residents commute to work in and out of the county.

Table 3-5 presents a comparison of the types of land uses and their acreages in Northfield between 1971 and 1999 demonstrates which natural resources are most susceptible to development pressures. Cropland and forestland have been the primary resources converted to other uses, particularly to residential development. As residential development on large lots of a ½ acre or larger increased, both cropland and forestland acreages decreased.

Table 3-5: Land Use Change in Northfield, 1971 - 1999

Land Use	1971 Acres	1999 Acres	1971-1999 Change
Forest	12,749	12,493	-256

Land Use	1971 Acres	1999 Acres	1971-1999 Change
Water and Wetlands	215	248	33
Agriculture (cropland and pasture)	698	567	-131
Small Lot Residential (< .5 acre)	20	19	-1
Large Lot Residential (> .5 acre)	617	929	312
Commercial	0	5	5
Industrial	0	4	4
Recreation	5	17	12

Source: 1971 and 1999 MassGIS Land Use data.

The land use tradeoffs between 1971 and 1999 were primarily a loss of forest and farmland and a gain in low-density residential development. During this time, cropland and pasture decreased by 131 acres, while forested land decreased by 256 acres. Residential lots greater than ½ acre increased by 312 acres.

The conversion of forest and agricultural land to building sites for single-family homes is the dominant land use change in Northfield, and in Western Massachusetts. Future development patterns in Northfield may depend on national and regional employment and population trends but also on local conditions that impact development and land use, including land use controls and infrastructure, such as public water, sewer, and broadband.

In May 2019, MassGIS released a new land cover/land use dataset. This statewide dataset contains a combination of land cover mapping from 2016 aerial and satellite imagery, LiDAR and other data sources. Land use mapping is derived from standardized assessor parcel information for Massachusetts. This land cover/land use dataset does not conform to the classification schemes or polygon delineation of previous land use data from MassGIS (1951-1999; 2005) so comparisons of land use change over time can't be made using this current data[6].

However, the 2016 land cover/land use dataset does reveal interesting information about Northfield that most residents probably already know. For example, most of the *land cover* is forests but the *land use* is primarily residential. Table 3-6 provides a summary of 2016 MassGIS land use and land cover data in Northfield.

Table 3-6: Summary of Northfield 2016 MassGIS Land Cover and Land Use Data

Land Cover	Acres	Land Use	Acres
Bare Land	215	Agriculture	2143.8
Cultivated	1460	Commercial	296.6
Deciduous Forest	6983	Forest	1775.6
Developed Open Space	853	Industrial	1448.0
Evergreen Forest	9749	Mixed use, other	424.0
Grassland	701	Mixed use, primarily commercial	146.0
Impervious	540	Mixed use, primarily residential	1535.6
Palustrine Aquatic Bed	46	Open land	3733.3

[6] https://docs.digital.mass.gov/dataset/massgis-data-2016-land-coverland-use.

Palustrine Emergent Wetland	229	Recreation	486.3
Palustrine Forested Wetland	396	Residential - multi-family	240.0
Palustrine Scrub/Shrub Wetland	27	Residential - other	227.3
Pasture/Hay	676	Residential - single family	3938.6
Scrub/Shrub	53	Right-of-way	716.2
Water	690	Tax exempt	4553.5
		Unknown	315.5
		Water	636.4

Source: 2016 Massachusetts GIS Land Use/LandCover data. **Due to methodological differences, 2016 Land Use Data is distinct and cannot be directly compared to previous Land Use statistics from MassGIS.**

Table 3-6: Land Cover and Land Use Percentages of Total Acreage in Northfield

Total Acres in Northfield = 22616.71			
Land Cover	**% of Total Acres in Town**	**Land Use**	**% of Total Acres in Town**
Bare Land	0.9	Agriculture	9.5
Cultivated	6.5	Commercial	1.3
Deciduous Forest	30.9	Forest	7.9
Developed Open Space	3.8	Industrial	6.4
Evergreen Forest	43.1	Mixed use, other	1.9
Grassland	3.1	Mixed use, primarily commercial	0.6
Impervious	2.4	Mixed use, primarily residential	6.8
Palustrine Aquatic Bed	0.2	Open land	16.5
Palustrine Emergent Wetland	1.0	Recreation	2.2
Palustrine Forested Wetland	1.8	Residential - multi-family	1.1
Palustrine Scrub/Shrub Wetland	0.1	Residential - other	1.0
Pasture/Hay	3.0	Residential - single family	17.4
Scrub/Shrub	0.2	Right-of-way	3.2
Water	3.0	Tax exempt	20.1
		Unknown	1.4
		Water	2.8

Source: 2016 Massachusetts GIS Land Use/LandCover data. **Due to methodological differences, 2016 Land Use Data is distinct and cannot be directly compared to previous Land Use statistics from MassGIS.**

The loss in natural resources may go beyond simply the loss in acreage. As farm and forest land acres are converted to residential and commercial uses the landscape becomes fragmented. Fragmentation of the landscape can negatively impact the quality of wildlife habitat, watershed protection, recreation opportunities, farm viability, forest management opportunities, and ultimately the municipal services budget.

Many rural towns in western Massachusetts have much of their landscape covered in forest vegetation. Unlike more urbanized towns, this forestland is not fragmented by roads or residential development. As development spreads across the landscape, wildlife habitat may become segmented so that animals requiring large amounts of interior forest habitat are forced to search for it in still more remote areas. Fragmenting large blocks of contiguous forestland also jeopardizes the water quality and quantity in many first and second order streams, which are the most extensive and sensitive components of a watershed's stream network. When a large forest block is fragmented by a subdivision, the resulting parcels associated with single family homes are often too small to manage individually for forestry purposes. Finally, the most inefficient method of providing municipal services such as police, fire, sewer, water, waste disposal, and plowing is associated with a fragmented landscape where residential development is spread sparsely across the town. The value of recreational opportunities associated with hiking, snowmobiling, and mountain biking often depends on whether there exists a network of fields and forests that are somewhat removed from residential areas. The indirect value of open farmland and unfragmented forests is an important concern in making decisions about future open space and recreational property protection and acquisition.

Infrastructure

Geography and land use have been a major factor in the development of Northfield's infrastructure. Natural resources, including a long stretch of the Connecticut River with adjacent prime farmland, as well as its scenic hills and mountains with vast upland forests have helped to shape and guide local land use patterns as well as limit the value that existing and potential infrastructure might offer towards the expansion of development beyond those lots with frontage on the main roadways in town. Permanently protected forest land, such as the Northfield State Forest, limits expansion to the east and to the west in Satan's Kingdom. Northfield also has substantial farmland in the Agricultural Preservation Restriction (APR) program, which permanently protects it from development. The Town is dependent on its natural resources to support its economy and considers these assets to be vital to a healthy environment and municipal resources, including recreation.

The Connecticut River divides the town with adjacent rich soil in flood plains that have been farmed for millennia and by indigenous people and by Europeans since the late 17th century. Major roads run parallel to the river on each side. Another crosses the river to join Main Street on the only bridge in a 20-mile span. (A pedestrian and bike bridge is being planned for the northern section of town.) This north-south axis with forested uplands and ridges on each side of the river has created a linear development pattern, reinforced by new zoning, that is somewhat restricted by frontage access to the two main roadways. Farming is a major industry and the uplands have forested land, some of which is state-owned and possibly open to logging. Glacially formed eskers and aquifers along the Connecticut River make the area rich in sand and gravel. However this puts a high quality water resource for the town at risk and increases commercial traffic. Planning for recreation and conservation of natural resources means taking into account the economic value of natural resource extraction, and whether those activities are sustainable.

Transportation Systems

Roads

State Route 2 and Interstate 91 are two significant New England highways that are located less than ten miles from the Town of Northfield. The town also has two primary transportation routes, Route 10 and Route 63, which provide Northfield with access to these highways. Routes 10 and 63 also link the town to Turners Falls, Greenfield, and Amherst. Route 142 is another major roadway in Northfield, connecting Northfield to Brattleboro, Vermont. Route 10 links Northfield to southwestern New Hampshire, and Route 63 links Northfield to Brattleboro, VT.

Transit

While the Franklin Regional Transit Authority (FRTA) provides fixed route service in Franklin County, there are no regular transit services available to the Town of Northfield. The FRTA provides demand response services (door-to-door transportation) for seniors, aged sixty and over, veterans, and people with disabilities in the Town of Northfield through the Bernardston Council on Aging.

In 2011, The FRCOG conducted a study of transit service in the Towns of Bernardston, Gill, and Northfield, which included public outreach and survey. Results of the study found that there is interest in fixed route and demand response bus service in the three north county towns, and that bus service along Rt. 5/10 to Northfield would not only be helpful, but it would also be vitally important for certain segments of the population, particularly the elderly, low-income households, and younger residents who are not yet able to drive[7]. However, due to Northfield's small population, and current necessity for residents to own vehicles, it is uncertain whether a transit system would consider a route through the town to be profitable.

Rail

A freight rail line runs from the northwest corner of town south along the Connecticut River. A second freight line crosses the Connecticut River just downstream of the Schell Bridge and runs through the length of the town east of the river through the Farms area; however there is no local passenger train station closer than the John W. Olver Station in Greenfield. Residents can board Amtrak services in Brattleboro and Greenfield. Railroads, with their elevated corridor, can become blockages for water flow through a watershed and inhibit animal passage over the tracks.

Air

The closest airport to Northfield in Franklin County is the Turners Falls Municipal Airport, a general aviation facility located in Montague. Other municipal airports are located in the region in the City of Northampton and Town of Orange. Commercial flights can be obtained at Bradley International Airport, an approximately 1 hour 15 minute drive south via I-91 to Windsor Locks, Connecticut.

[7] North County Transit Study, FRCOG, 2011

Pedestrian and Bicycle

Since 1991 and the passage of the federal Intermodal Surface Transportation Efficiency Act (ISTEA), bicycling and walking have been recognized as viable and efficient modes of transportation. Consequently, bicycle and pedestrian facilities are included as a regular part of transportation planning activities on the Federal, state, regional, and local levels. Not only are bicycling and walking integral components of the transportation system in Northfield and Franklin County, but they are also crucial components that help make the region a livable place. In Northfield, new 6-ft sidewalks were installed along Main Street. Highland Avenue and Holton Street have smaller older sidewalks. On other roads both biking and walking take place on the roads themselves, as there are no sidewalks, bike lanes, or even wide shoulders to accommodate these users. The U.S. Department of Transportation and the Federal Highway Administration have recently focused their attention on the important role these modes of transportation play and the many benefits they provide a community, including: reduction of greenhouse gases and other air pollution, lowered energy costs, less use of land and pavement, increased health benefits for people, economic savings, increased social interactions, and community revitalization.

Recently the FRCOG partnered with the YMCA in Greenfield, 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 FRCOG has completed sets of walking maps for each town in Franklin County, including one in Northfield: a 2-mile loop through the historic town center which features wide grass verges between the road and sidewalk and a glimpse of the Northfield Main Street Historic District.[8]

The Franklin County Bikeway is a project of the FRCOG[9] that includes a biking network, with both on-road and off-road facilities, throughout Franklin County, and into Vermont and New Hampshire, linking employment, recreational, and educational destinations. Shared bike routes that travel on the roads within Northfield include:

- Connecticut River Bikeway – Intermediate/Advanced. This route travels from South Hadley, Massachusetts through Sunderland Center on the same route as the Connecticut River Scenic Byway. From there, bikeway routes follow the river through Turners Falls and Ervingside into Northfield Center where they rejoin the Connecticut River Scenic Byway route and continue north into New Hampshire and Vermont.
- Northfield Connector – Intermediate/Novice (14 Miles). This route travels through the village of Ervingside in Erving into Northfield Center from the existing Canalside Trail in Turners Falls. It provides a link to the Northfield Mountain Recreation and Environment Center from Montague and downtown Northfield. To the south, this route connects to Sunderland Center via the Connecticut River Route on Rt. 47. To the west,

[8] Walking maps are available at: http://www.walkfranklincounty.org/maps.php.
[9] Franklin County Bikeway maps are available at: http://frcog.org/program-services/transportation-planning/

this route connects to the Greenfield-Montague Loop via the Canalside Rail Trail Bridge over the Deerfield River.

- ❖ Northeast Franklin County Route – Advanced (15.5 Miles). This route connects the Towns of Northfield and Orange and travels near Mount Grace State Forest and to Main Street (Route 63) in Northfield.

Once the pedestrian Schell Bridge is completed, the bikeways will link Pioneer Valley to Vermont and New Hampshire.

Water Supply

The Town of Northfield has two community water systems: the Northfield Water District and the East Northfield Water Company, which are privately-owned and not under the control of the Town. The remainder of the town's population is serviced by private wells.

The Northfield Water District serves approximately 900 people in the vicinity of Northfield Center. The existing well, the Strowbridge Well, is located off Strowbridge Road, along the Mill River. Water is pumped to a storage tank with a 0.35 million-gallon capacity. Water production for 2001 was 19.2 million gallons with an average daily use of 44,000 – 45,000 gallons per day. The approved daily withdrawal volume for this well is 144,000 gallons. The approved volume measures the capacity of the well and its recharge area to provide water without diminishing returns under severe conditions. Overall, 93 percent of the water went to residences and 7 percent was unaccounted for or consumed by faulty equipment. Given that the average daily water withdrawal for the Strowbridge Well is less than half the approved withdrawal, the Northfield Water District appears to have the capacity to support additional water demand.

The Northfield Water District has a 400-foot Zone I surrounding its wellhead. The District does not own the entire Zone I radius. According to the Mass. Department of Environmental Protection (DEP), the land uses that might threaten the ground water quality include pasture lands, residences, and roads. The Zone II recharge area for the well was delineated as part of the DEP's Source Water Assessment Program (SWAP). It, too, has land uses and activities, such as residential, agricultural, and light commercial, which are potential sources of contamination. The DEP ranks the Strowbridge Well's susceptibility to contamination as high given that one high threat land use, pesticide use and storage, is present within the supply protection areas.

The East Northfield Water Company has a surface water supply, the Grandin Reservoir, located off Louisiana Road in the northeastern corner of town. Northfield Mount Hermon School owns the reservoir and approximately 95 percent of its watershed. In 2016, approximately 1300 acres of land abutting the reservoir was converted into State Forest, which should provide additional protection to the watershed. The reservoir is approximately 7.1 acres in size and has a total storage capacity of 30 million gallons. The Franklin County Regional Water Supply Study (FRCOG; 2003) estimated that this water supply served a population of 1,450 year round, with an average daily use of 96,361 gallons. It has a registered withdrawal volume of 200,000 gallons per day, the amount the State allows the supplier to withdraw based on historical use records. In 2018, The Greenfield Reporter noted that there were 300 residential customers. The East Northfield Water Company has adequate capacity to support at least 1500 people.

The East Northfield Water Company has an approved watershed protection plan, regularly inspects the watershed to maintain a waiver from filtration, and provides for watershed management. Surface water supplies like Grandin Reservoir are considered particularly vulnerable to contamination. The land uses and activities, as noted in the DEP's Source Water Assessment Report, that are potential sources of contamination include road access, potential for the presence of aquatic mammals, and forest operations such as logging. In the hot, rainy summer between April and September of 2018, water was found to contain above acceptable levels of bacteria in 8 of 52 tests. DEP held hearings and the company is exploring options, including the installation of a costly filtration system. According to the Northfield 2020 Open Space Committee, the water company explains that they do have a purification system in place so water is safe to drink at the tap—though customers often complain of cloudy or brown water. Because of the small number of customers and large expense of added filtration, customers are facing huge price increases for their water supply while the company operates at a loss, according to the Open Space Committee.

The 2014 Master Plan for Northfield states an objective to improve public services through a strategy that plans for the possibility of potential growth and ensures the future availability of water.[10] Actions to support this objective include: to develop a plan for future water improvements and to support Northfield Water District's efforts to develop a plan for upgrading the system. The Water System Improvement Plan would need to:

- Identify location of a new well (the Mill Brook Aquifer is a potential well site),
- Identify other potential sites for additional supply,
- Replace mains throughout,
- Identify rate increases (The average household paid approximately $400/year in 2014. The last rate increase was in 1996.)

Wastewater treatment facility and demand

The Town of Northfield's sewage treatment plant was constructed in 1972, after the passage of the Federal Water Pollution Control Act. Prior to 1972, Northfield's community sewer systems consisted of four sewer lines leading to the Connecticut River. In 1972, the Town built the treatment plant and constructed inceptor lines to the existing community sewers. The Town has sewer lines near the Thomas Aquinas campus and in downtown Northfield. Over the past thirty years, there have been a number of sewer line extensions, the largest of them along East Street. Extensions have also occurred along School Street, Glen Road, Mill Street, along Dickinson Street to the Town library, along Main Street from Mill Street to Pentecost Street. There is interest in extending this along Main Street south to the intersection of routes 63 and 10.

Northfield's sewage treatment plant has a capacity of 275,000 gallons per day, and a current average daily usage of approximately 100,000 gallons per day. In the past, there have been serious stresses on the treatment plant due to problems of infiltration and inflow. Infiltration involves groundwater entering the collection system via breaks within the system piping, open pipe joints, or cracks within manholes. Inflow involves the water that enters the system through direct connections such as catch basins, roof gutter leaders, and leaking manhole covers. By the early

[10] https://www.northfieldma.gov/sites/northfieldma/files/uploads/a_master_plan_for_northfield.pdf

1990s, inflow and infiltration had increased the average wastewater flow to 400,000 gallons per day, significantly above the plant's capacity. Due to upgrades and repairs, the average usage has now dropped dramatically, to 120,000 gallons per day.

Potential development constraints

The geographic boundaries of the current sewer system pose a constraint on future development, especially large-scale uses. In the absence of sewer service, developed land uses must rely on septic systems for their wastewater treatment needs. The 1977 Master Plan indicates that the reliance on septic systems could pose a problem in the most developed areas of Northfield, such as East Northfield and Northfield Center. A review of soil maps for these areas as part of the Master Plan showed that the soils are incapable of absorbing large quantities of waste.

Since then, the Sewer Commission and the Board of Health have both agreed that it is in the Town's best interest to expand the sewer system to serve already developed areas, as much as is financially and geographically possible. There is some potential to expand the sewer system in Northfield Center and in East Northfield near the campus, and as mentioned above, some of these expansions are already in the works.

The potential for Northfield to accommodate large-scale commercial or light industrial land uses may be restricted by the town's limited sewer infrastructure. Many commercial and light industrial uses require sewer and water infrastructure to comply with environmental regulations and provide adequate protection for natural resources. Access to sewer infrastructure can be particularly critical with respect to industrial uses to prevent hazardous materials from entering the groundwater. The DEP usually requires industrial firms to obtain an industrial wastewater discharge permit and to hook up to a wastewater treatment facility.

Extending sewer lines outside of the currently developed areas, to proposed locations for commercial or light development may not be feasible due to the high costs involved. When the Town of Orange extended sewer service three-quarters of a mile to the Randall Pond Industrial Park, the extension itself cost $330,000, and there were then additional expenditures in excess of $200,000 for laying down the sewer lines within the industrial park. Orange was fortunately able to receive funding through the Federal Economic Development Administration (EDA) to help subsidize the development of its industrial park, including the sewer line extensions. Northfield similarly may be able to tap into EDA or other federal or state funding sources to help subsidize this type of project.

Northfield's roadway network, community water system, and wastewater treatment plant and collection system could have a great impact on future development patterns. Water and sewer lines could be used to provide for concentrations of buildings with commercial, civic, and residential uses in village center areas. Sewer could help certain industrial uses to become established. If planned, Northfield's infrastructure could be used to direct development to areas that make the most sense given the town's priorities and the location of prime farmland soils and environmentally sensitive areas. On the other hand, sewer and water line expansion can result in a spreading of development, potentially losing its effectiveness as a growth management tool.

The 2014 Master Plan for Northfield states an objective to improve public services through a strategy that plans for the possibility of potential growth and considers alternative ways of extending sewer service.[11] Actions to support this objective include:

- Explore ways of increasing sewage capacity,
- Consider establishing a Sewer Enterprise Fund, and
- Consider use of on-site sewage treatment plants for large-scale commercial and/or light manufacturing or industrial uses.

The 2014 plan notes that the limited geographical area where service is currently available may inhibit certain kinds of development in specific areas in town.

Solid Waste Management

Northfield's Transfer Station is located at 142 Caldwell Rd in west Northfield. It features dual stream recycling (paper/cardboard vs. plastic, metal, and glass containers), a trash compactor, a composting bin, a shed for returnable bottles that benefits the local food pantry, and a Salvation Army container for clothing, and a shed that contain "take-it-or-leave-it" articles, including children's items, kitchen ware, lamps, books, decorations, and all manner of assorted "stuff". The station also accepts electronics, pellet bags, mercury, CFLs, batteries, propane, tires, and Freon items to be recycled or disposed of properly, metal recycling and building materials. The annual permit currently costs $25, plus payments for household waste placed in the trash compactor in the form of "pay as you throw" bags purchased off-site. Additional payment is required to dispose of items in the construction dumpster, as well as for the disposal of Freon, propane, tires and electronics. 831 stickers were issued in 2018, 850 in 2017, 1050 in 2016, 901 in 2015, and 976 in 2014.

Northfield is a member of the Franklin County Solid Waste Management District. Therefore, all residents of Northfield can dispose of household hazardous wastes in the fall through their program.

High Speed Internet

The availability of high-speed internet is key to maintaining existing businesses and attracting new businesses to the community. Equally important, it is anticipated that the availability of high-speed internet will attract more families with young children, which may help to address the falling school enrollment rates experienced in recent years. Northfield is in an unusually good position compared to many other towns in western Massachusetts, with approximately 96% of the town having access to high-speed cable internet. Satellite would be another source.

[11] https://www.northfieldma.gov/sites/northfieldma/files/uploads/a_master_plan_for_northfield.pdf

Long-Term Development Patterns

Land Use Controls

Long-term development patterns will be based on a combination of land use controls and population trends.

The newest Northfield Zoning Bylaws were approved and adopted at Annual Town Meeting in 2017. These bylaws were reorganized and updated to include several new provisions to allow the Town to implement the 2014 Northfield Master Plan.

The town is divided into six main districts: Residential-Agricultural (RA), Residential-Agricultural-Forested (RAF), Village Center (VC), Planned Development (PD), Recreational Tourism (RT), and overlay districts. The three new districts are Planned Development (PD), Recreational Tourism (RT), and Village Center (VC). The Planned Development District is meant to allow multiple uses and provide a special permit process to encourage development of the former Northfield Mount Herman School campus. Each district has some "by right" uses provided, and the Planning Board is allowed to grant certain special permits and conduct site plan review for nonresidential uses.

Residential-Agricultural (RA), Residential-Agricultural-Forested (RAF), the Water Resources Overlay District, Floodplain Overlay District, and Solar Overlay District have been retained and updated from the Town's former bylaws. The Floodplain Overlay District and the Water Supply Protection Overlay District restrict uses in the overlay areas to protect these important resources. The Solar Photovoltaic Overlay District provides for by-right solar installations as required by the Green Communities Act.

The RA district runs north south along the Connecticut River and includes much of Route 63, Route 142, except the new districts. The RAF includes the sections of town away from the Connecticut River that have steeper slopes and less existing development (See Zoning Maps at the end of this section).

Both the RA and RAF districts allow the following uses by right: single-family dwellings, two-family dwellings, municipal use, museum or library, open space residential development, elderly housing; congregate residence, not to exceed six units, agriculture, agriculturally-related uses on a farm, greenhouse, conservation/wildlife preserve, and studios for artists, photographers, interior decorators, other design-related uses. Allowed accessory residential uses include home occupation, family home day care, not to exceed 6 children, and storage or parking of 1 camper. Most other commercial and industrial uses are allowed in both the RA and RAF districts by special permit. The uses allowed by special permit include both small commercial uses, such as a craft shop or hotel, motel, inn, and large industrial uses, such as manufacturing, processing, fabrication, and packaging (Northfield Zoning Bylaws, Section 5.4, Table 1. Schedule of Uses).

The VC, PD, and RT districts allow the following uses by right: agriculture, agriculturally-related uses on a farm, greenhouse, conservation/wildlife preserve, municipal use, museum or library, single-family dwellings, two-family dwellings, multi-family dwelling (maximum of four units per building), elderly housing; congregate residence, not to exceed six units, and accessory residential

uses including home occupation, bed and breakfast, family home day care, not to exceed 6 children, and storage or parking of 1 camper. Studios for artists, photographers, interior decorators, other design-related uses, bank or other financial institution, and professional or business office are also allowed by right in VC, PD, and RT districts. Many uses are allowed, either by right or by special permit, in some of these districts, but not others. (Northfield Zoning Bylaws, Section 5.4, Table 1. Schedule of Uses).

All districts: RA, RAF, VC, PD, and RT allow single-family homes and two-family dwellings by right (Northfield Zoning Bylaws, Section 5.4, Table 1. Schedule of Uses). Site Plan Review is required for any alteration, reconstruction, or renovation of any multi-family use involving 1,500 square feet or more of gross floor area, or of an existing building, or change in use requiring five or more parking spaces. (Northfield Zoning Bylaws, Section 3.5). All residential development must adhere to the town's requirements for setbacks and lot sizes except those that meet the criteria for Open Space Residential Development (Northfield Zoning Bylaws, Section 7.2, Table 2). Uses and structures subject to Site Plan or Special Permit approval or proposed for Open Space Residential Development must conform wherever possible to the Principles of Rural Design (Northfield Zoning Bylaws, Section 8.1.1).

Overlay Districts: Flood Plain, Water Supply Protection, Solar Photovoltaic, and a (proposed) Licensed Marijuana Business

There are four overlay districts: The Flood Plain Overlay District, Water Supply Protection Overlay District, (proposed) Licensed Marijuana Business Overlay District, and the Solar Photovoltaic Overlay District.

The overall purpose of the Floodplain Overlay District is to decrease the impacts that can be associated with flooding including disruption of utility networks, pollution or contamination of surface and ground waters, loss of life and property, and the costs of response and cleanup. All development within the overlay district are prohibited unless plans can be shown by a registered professional engineer or architect that they will not result in any increase in flood levels during a 100-year flood.

The Water Supply Protection Overlay District allows no new uses within the Zone 1 Wellhead Protection Area. Within Zones 2-7, uses are prohibited that involve hazardous wastes and materials, waste disposal and storage, trucking, transportation, and other business uses that involve degreasers and petroleum products, commercial and industrial uses that treat process wastewater using on-site systems, commercial mining of land, underground fuel storage, and uses covering more than 25 percent of any given lot with impervious surfaces that has an average slope of less than 25 percent, and, more than 15 percent of any given lot with an average slope of greater than 25 percent.

The Licensed Marijuana Business Overlay District allows for certain marijuana establishments within the overlay zone with site plan review. It is located in the south end of town, along Route 63 and the Connecticut River in the Farms area.

The Solar Photovolatic Overlay District allows large-scale ground-mounted photovoltaic solar installations to be constructed by-right on up to five acres, as required by the Massachusetts Green Communities Act. (See Zoning Maps at the end of this section)

Open Space Residential Development

The Open Space Residential Development section of the bylaw allows for the by-right development (after site plan review by the Planning Board) anywhere in Northfield except the Village Center Districts of parcels with no minimum parcel size or number of lots required, in a manner that results in adequate protection of the site's environmental resources (Northfield Zoning Bylaws, Section 9.3.3). By allowing a reduction in frontage and minimum lot size requirements and alternative development configurations, Open Space Residential Development is intended to foster the preservation of Northfield's open space resources as identified in the Master Plan, especially large contiguous blocks of forested back-land as a significant resource-base for forestry and agriculture and for the protection of the town's water resources and other unique environmental assets. Plans must preserve by conservation restriction a minimum area of open space according to district: RAF District (minimum 75 percent, and RA, PD districts (minimum 60 percent). A Development Impact Statement and Conservation Analysis, which is used to present sufficient information on the environmental and open space resources and to show minimum preserved open space, is required as a Site Plan review application (Northfield Zoning Bylaws, Section 9.3.3).

Additional flexible development provisions for by-right Open Space Residential Development include the formula for calculating the maximum number of residential dwelling units, which takes into account site-specific development limitations that make some land less developable than other land (Northfield Zoning Bylaws, Section 9.3.4). There is also a Density Bonus (Northfield Zoning Bylaws, Section 9.3.5), which allows an increase in maximum number of residential units, and a Density Transfer or Transfer of Development Rights), which both encourage flexibility in the location and layout of development within RA and PD districts, in order to advance important goals of the Northfield Master Plan—such as public access to open space, affordable housing, additional open space preserved, or solar-ready development. The Lots in More than One District provision (Northfield Zoning Bylaws, Section 9.3.8), Dimensional and Design Requirements (Northfield Zoning Bylaws, Section 9.3.10), and Permanent Open Space (Northfield Zoning Bylaws, Section 9.3.11) are additional provisions of Open Space Residential Development which give the Planning Board flexibility with land use and development determinations to be consistent with the preservation of open space, natural resources, and unique natural features in the town.

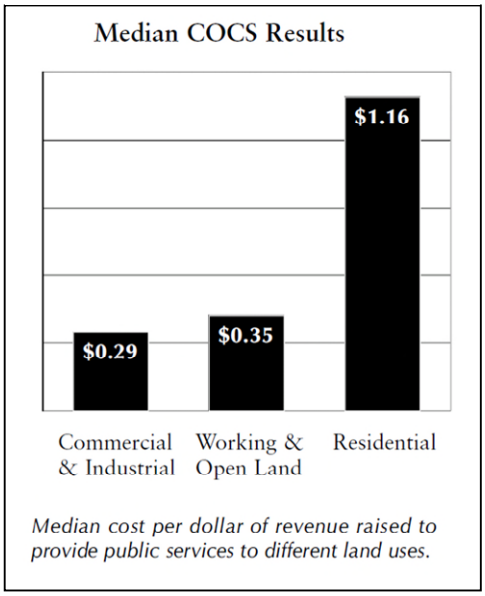
While the Town is sensitive to protecting open space and rural character, it is also actively considering ways to promote business development that would increase tax revenue and employment opportunities in town. In 2018, an ad hoc Multi-Use Business Park Exploratory Committee was formed and charged with evaluating the prospects of creating a multi-use business park in Northfield including potential locations, the nature and types of businesses that might be housed there, public or private ownership opportunities, and outlining the actions needed to create the park.

Cost of Community Services

It is important to understand the measurable fiscal impacts of different land uses. For instance, open space (e.g. farmland/forest), residential, and commercial /industrial development each contribute differently in the amount of property tax revenues generated and they often require different levels of municipal services.

The challenge for Northfield and other communities is to find a model for growth that protects vital natural resource systems and maintains a stable property tax rate. In designing the model, it is important to understand the fiscal impact of different land uses, which can be calculated based on the relationship of property tax revenues generated to municipal services used. Although protected open space typically has a low assessed value and thus generates low gross tax revenues, municipal expenditures required to support this use are typically much lower than the tax revenue generated.

Figure 3-8: Summary of Cost of Community Services (COCS)



Source: American Farmland Trust; 2016. http://www.farmlandinfo.org/sites/default/files/COCS_08-2010_1.pdf

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 spaces, while not generating the same tax revenues 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.

Figure 3-8 demonstrates the summary findings of 151 COCS studies from around the country. For every dollar of property tax revenues received from open space, the amount of money expended by the Town to support farm/forestland was under fifty cents while residential land use cost over a dollar. Taxes paid by owners of undeveloped farm and forestland help to pay for the services required by residential land uses. When a town has few land uses other than residential, homeowners and renters pay the full cost of the services required to run a municipality, maintain public ways, and educate young people. In this way, local property real estate taxes tend to rise much faster in communities that have little protected land and higher rates of residential development.

In 2008, the Northfield Open Space Committee did such an analysis, using the AFT and University of Wisconsin COCS models (Objective A2 in Section 9 of the original OSRP for Northfield), which showed that residential uses required more in services than they provided in tax revenues and therefore that residential use is subsidized with the tax revenues generated by other land uses

like open space and commercial and industrial property (See Figure 3-9: Summary of Cost of Community Services (COCS) Studies, Northfield, MA).

Figure 3-9 shows a COCS study completed for the Town of Northfield, which found that:

- 76% of fiscal revenue in Fiscal Year 2008 was generated by residential land, 18% was generated by commercial/industrial land, 5% by agricultural/open space.
- 88% of expenditures were used to provide services for residential land compared with 7% for commercial/industrial land, and less than 2% for agricultural/open space.

In other words, in Fiscal Year 2008:

- For each $1 of revenue received from residential properties, Northfield spent $1.16 providing services to those lands.
- For each $1 from commercial/industrial land, the Town spent 38 cents; and
- For each $1 received from agricultural/open space, the Town spent 35 cents.

Residential land uses created a deficit of $799,000, while the other two categories generated surpluses: $743,000 from commercial/industrial, and $216,000 from agricultural/open space. While residential land use contributes the largest amount of revenue, its net fiscal impact is negative.

Figure 3-9: Summary of Cost of Community Services (COCS) Studies, Northfield, MA

Land Use *(financial data in thousands of $)*	**Residential**	**Commercial/ Industrial**	**Agricultural/ Open Space**	**Other** *(tax exempt)*	**Total**
Land Area (acres)	5,737	3,266	13,110	846	22,959
Property Value	279,620	68,708	35,529	77,929	461,786
Taxable Value	279,620	68,708	19,603	0	367,931
Total Revenue	5,067	1,194	331	63	6,655
Total Expenditures	5,866	451	115	222	6,655
Expenditures as a fraction of Revenues for that Land Use	**1.16**	**0.38**	**0.35**		

Source: Town of Northfield; 2008. https://www.northfieldma.gov/sites/northfieldma/files/uploads/cocs_summary.pdf

Jerry Wagener, Chair of the Northfield Open Space Committee at the time, compiled a comparison of tax revenue coming from state-owned conservation land with privately held land enrolled in Chapter 61 for FY2017 for the Town of Northfield. He found that while land enrolled in Chapter 61 contributed $1.05 per acre (in east Northfield) or $1.48 per acre (in west Northfield), the State paid $16.27 per acre of land, indicating that in some cases, permanently protected land owned by the State could be a source of additional income for the town.

These findings support open space and farmland preservation, and commercial and industrial development, as a way to help towns balance their budgets. 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, who require more in services.

The second component of a balanced land use plan concerns the development of other tax-generating land uses beyond open space. The COCS studies showed that for every dollar of taxes generated by commercial and industrial uses, the cost to towns for these uses resulted in a positive net gain.

Patterns of commercial and industrial uses vary considerably between towns. It is just as critical for communities to consider the long-term impact of commercial and industrial development on quality of life. Increased industrial development could generate jobs as well as an increased demand for housing in town. Permanently protecting a large portion of the town's open space and farmland from development could provide locally grown food and jobs, but may also jeopardize the ability for future generations to determine the best use for the land. It also can increase the cost of the remaining available land, making affordable housing development more difficult.

Additionally, the current capacity of different services in town is a key factor when considering what types of development to encourage. If a community is near or at capacity for services such as police, fire, water, roads, or schools, any additional population growth could be quite costly as these services would need to be expanded. However if a community has an excess in service capacity in these areas, new residential growth would not necessarily be a strain on the town's budget.[12] In a climate of declining school enrollment, while acknowledging that home owners with children cost the town more than they pay in taxes, a community might determine that they want to attract families with children in order to maintain a valued community school.

Northfield may be able to sustain and enhance both the community's wealth and its agricultural and rural village character by continuing to pursue strategies that encourage the types of development it wishes to have and by actively conserving land, protecting natural resources, and enforcing zoning measures that direct development to appropriate locations (with sewer and water infrastructure, for example).

[12] *Cost of Community Services Studies: Making the Case for Conservation.* Julia Freedgood, 2002.

SECTION 4

ENVIRONMENTAL INVENTORY AND ANALYSIS

This section of the Northfield Open Space and Recreation Plan provides a comprehensive inventory of the natural resources and the significant cultural resources within the Town of Northfield. The purpose behind any inventory is to provide a factual basis upon which assessments can be made. The information presented here is intended to help Town officials, other volunteers, and landowners make informed land use decisions within a context of ecosystem integrity and high-quality recreational experiences for all residents. The environmental inventory identifies and describes the Town's soils, special landscape features, surface waters, aquifers, vegetation, fisheries and wildlife, and unique environments and scenic landscapes.

All of the landscape features described and assessed in this section are found on parcels of land owned by both private and public landowners. Bodies of water, interesting scenic views, historical cemeteries, wildlife habitat areas, and hiking trails may be on private lands. It is the intention of this planning effort to respect the needs, desires, and privacy of landowners and to encourage access to public recreational lands and to plan for the long-term sustainability of all of Northfield's aquatic and terrestrial ecosystems.

The section entitled *Topography, Geology, and Soils* 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 values, public access, and any current or potential quality or quantity issues. Northfield's forest, farmland, and wetland vegetation types are documented including rare, threatened, and endangered species. In *Fisheries and Wildlife*, wildlife, habitat, special corridors, and rare, threatened, and endangered species are discussed. Northfield's *Scenic Resources and Unique Environments* are identified and described. Finally, *Environmental Challenges* addresses current and potential problems or issues that may influence open space or recreation planning.

The scenic landscape of the Town of Northfield has been cherished by its residents for generations. This Open Space and Recreation Plan is intended to help residents protect the town's scenic value and natural resources while recognizing that people need places to live, learn, work and play. These needs require infrastructure: homes, roads, power, water, wastewater systems, communications etc. Infrastructure, in turn, both depends upon and impacts critical natural systems. One way to understand the impact of development on natural resources is to study the *ecosystems* of the town and the region.

A. DOCUMENTING AND MAPPING ECOSYSTEMS

An ecosystem is a concept that describes how living organisms (plants, animals and microorganisms) interact with each other and their physical environment (soil, climate, water, air, light, etc.). Ecosystems exist at different scales. A large forest can be an ecosystem; so can a

decayed tree trunk. The integrity of ecosystems depends on the relationship between living beings and their environment. Wetlands, for example, are ecosystems consisting of plants and animals that depend on surface water and ground water. Wetland vegetation grows where soils are saturated by water for at least several weeks a year. This vegetation provides shade, food and habitat for a wide variety of insects, birds, fish, reptiles and amphibians.

Ecosystems provide a variety of "services" that are very important to human communities, including ecological services and cultural amenities. Wetlands, for example, trap and remove sediments, nutrients and toxic substances from surface water. They recharge water to the ground, retain it during droughts, and store floodwaters during and after storms, preventing damage to public and private property. Cultural amenities include the recreational use of open spaces, the quality of life benefits that are maximized by maintaining the area's rural character and scenic beauty, and the direct and indirect beneficial impacts that well-conserved natural resources, such as good drinking water and open spaces, have on the local economy.

Just as the Town of Northfield contains multiple and varied ecosystems, the state of Massachusetts, while relatively small, has many diverse ecosystems and habitats. Documentation and mapping of such ecosystems and habitats – and their associated flora and fauna – can be a first step toward protecting and preserving these resources.

BioMap2

In 2010 The Massachusetts Department of Fish and Game and The Nature Conservancy launched *BioMap2: Conserving the Biodiversity of Massachusetts in a Changing World.*[1] This project, produced by the Natural Heritage and Endangered Species Program (NHESP), is a comprehensive biodiversity conservation plan for Massachusetts, and endeavors to protect the state's biodiversity in the context of projected effects of climate change.

BioMap2 combines NHESP's 30 years of rare species and natural community documentation with the Division of Fish and Wildlife's 2005 State Wildlife Action Plan (SWAP)[2]. It also integrates The Nature Conservancy's assessment of ecosystem and habitat connections across the State and incorporates ecosystem resilience in the face of anticipated impacts from climate change. *BioMap2* data replace the former BioMap and Living Waters data.

The following are the core findings summed up in BioMap2's Executive Summary.

Core Habitat Statewide Summary: Core Habitat consists of 1,242,000 acres that are critical for the long-term persistence of rare species and other Species of Conservation Concern, as well as a wide diversity of natural communities and intact ecosystems across the Commonwealth. Core Habitat includes:

- Habitats for rare, vulnerable, or uncommon mammal, bird, reptile, amphibian, fish, invertebrate, and plant species;
- Priority Natural Communities;
- High-quality wetland, vernal pool, aquatic, and coastal habitats; and

[1] http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/land-protection-and-management/biomap2/
[2] http://www.mass.gov/eea/agencies/dfg/dfw/

- ❖ Intact forest ecosystems.

Critical Natural Landscape Statewide Summary: Critical Natural Landscape (CNL) consists of 1,783,000 acres complementing the Core Habitat, including large natural Landscape Blocks that provide habitat for wide-ranging native species, support intact ecological processes, maintain connectivity among habitats, and enhance ecological resilience. The areas include buffering uplands around coastal, wetland and aquatic Core Habitats to help ensure their long-term integrity. CNL, which may overlap with Core Habitat, includes:

- ❖ The largest Landscape Blocks in each of 8 ecoregions; and
- ❖ Adjacent uplands that buffer wetland, aquatic, and coastal habitats.

NHESP Priority Habitats

Priority and Estimated Habitats is a program administered by NHESP. Identification and mapping of Priority and Estimated Habitats is based on the known geographical extent of habitat for all state-listed rare or endangered species, both plants and animals, and is codified under the Massachusetts Endangered Species Act (MESA). Habitat alteration within Priority Habitats is subject to regulatory review by the Natural Heritage & Endangered Species Program. Priority Habitat maps are used for determining whether or not a proposed project must be reviewed by the NHESP for MESA compliance.[3]

Benefits of BioMap2 and NHESP Priority Habitats

On the statewide level, mapping Core Habitat and Critical Natural Landscapes helps to guide strategic conservation to protect those areas that are most critical to the long-term survival and persistence of rare and other native species and their related habitats and ecosystems. On the local level, Northfield can use this information to better understand where the town's ecosystems and habitats fit into the bigger picture. For example, a small parcel of land could be a key link to two larger, intact ecosystems.

On an individual landowner level, *BioMap2* – as well as NHESP Priority and Supporting Habitats – is an important tool that can be used to apply for grants to help improve, manage and monitor certain lands. An example is the Mass Wildlife Landowner Incentive Program, which helps fund efforts to maintain grasslands and create areas of young tree and shrub growth (early woodlands) to enhance wildlife habitat, with preference given to land that is classified as, or located nearby, NHESP areas.

Information and mapping from *BioMap2* and NHESP Priority Habitats will be referenced throughout this section on Environmental Inventory and Analysis. BioMap2 Core Habitat covers 7,573 acres in Northfield, or nearly 33.5% percent of the town's total land area. NHESP Priority Habitats for Rare and Endangered Species are shown on the Scenic Resources & Unique Environments map at the end of this section.

[3] http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/

Resiliency to Climate Change

In 2011, the Massachusetts Executive Office of Energy and Environmental Affairs issued the *Massachusetts Climate Change Adaptation Report.*[4] Climate change will result in potentially profound effects on the economy, public health, water resources, infrastructure, coastal resources, energy demand, natural features, and recreation throughout the state. The issue of climate change, and in particular climate change adaptation, is complex. The impacts of climate change will vary not only geographically but also temporally—some of the impacts may not be felt for another 30 years or further in the future, while others are already upon us. When considering land conservation strategies and suitable sites for recreation facilities, climate change adaptation and resiliency should enter into the decision-making process of the town.

The Nature Conservancy (TNC) released a report in 2013 entitled, *Resilient Sites for Terrestrial Conservation in the Northeast and Mid-Atlantic Region.*[5] According to the Introduction of the TNC report, climate change is expected to alter species distributions. As species move to adjust to changing conditions, federal, state and local agencies and entities involved in land conservation need a way to prioritize strategic land conservation that will conserve the maximum amount of biological diversity despite shifting species distribution patterns. Current conservation approaches based on species locations or on predicted species' responses to climate, are necessary, but hampered by uncertainty. TNC states that it offers a complementary approach, one that aims to identify key areas for conservation based on land characteristics that increase diversity and resilience. The central idea of this project is that by mapping key geophysical settings and evaluating them for landscape characteristics that buffer against climate effects, conservationists can identify the most resilient places in the landscape.

The Nature Conservancy's resilience analysis aims to identify the most resilient examples of key geophysical settings (landscapes) to provide conservationists with locations where conservation is most likely to succeed over centuries. The Massachusetts Division of Conservation Services' Landscape Partnership Grant Program, which seeks to preserve large, unfragmented, high-value conservation landscapes, including working forests and farms of at least 500 acres in size, specifically references the TNC report and mapping.[6]

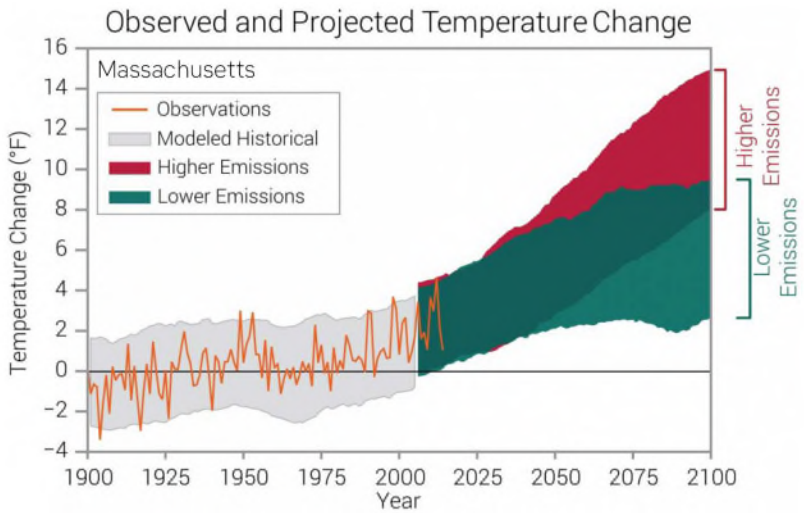
Annual precipitation averaged around 46" between 1971 and 2000 in the Connecticut Basin, which encompasses the entire Town of Northfield.[7] Precipitation in the winter season is expected to experience the greatest change between now and the end of the century, with an increase of 1-25% by mid-century (up 6 inches more by the 2050s), and of 7-37% by end of century (potentially increasing more than 8 inches by the 2090s). Annual and seasonal projections for consecutive dry days, or for a given period, the largest number of consecutive days with precipitation less than 1 mm (~0.04 inches), are variable throughout the 21st century. Seasonally, the fall and summer seasons are expected to continue to experience the highest

[4] https://www.mass.gov/service-details/2011-massachusetts-climate-change-adaptation-report
[5]https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx
[6] http://www.mass.gov/eea/grants-and-tech-assistance/grants-and-loans/dcs/grant-programs/landscape-partnershipprogram.html
[7] Massachusetts Climate Change Projections 2017, Northeast Climate Science Center, UMass Downscaled Projections for Major Basins in MA. www.resilientma.org.

number of consecutive dry days. The fall season is expected to experience an increase of 0-3 days in consecutive dry days by the end of the century.

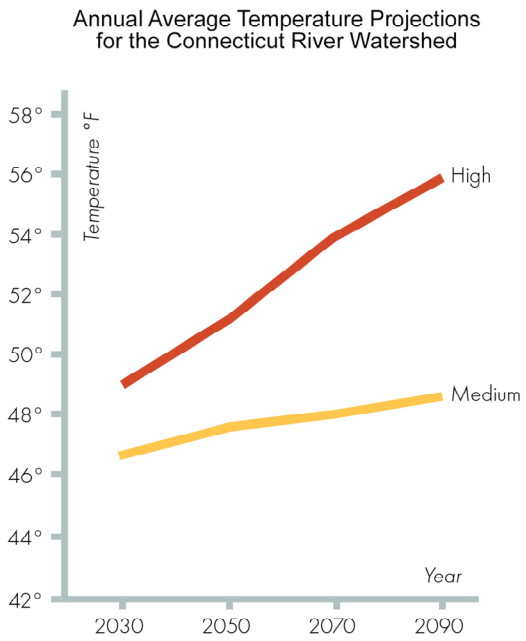
Climate projections for Massachusetts indicate that in future decades, winter precipitation could increase, but by the end of the century most of this precipitation is likely to fall as rain instead of snow due to warmer winters. There are many human and environmental impacts that could result from this change including reduced snow cover for winter recreation and tourism, less spring snow melt to replenish aquifers, higher levels of winter runoff, and lower spring river flows for aquatic ecosystems.[8]

Between 1971 and 2000, the average annual temperature was 47 degrees Fahrenheit. Average temperatures ranged from 25 degrees Fahrenheit in winter to about 68 degrees in summer. The Connecticut basin is expected to experience increased average temperatures throughout the 21st century. Maximum and minimum temperatures are also expected to increase throughout the end of the century. These increased temperature trends are expected for annual and seasonal projections. Seasonally, maximum summer and fall temperatures are expected to see the highest projected increase throughout the 21st century, but minimum winter and fall temperatures are also expected to increase throughout the 21st century.[9]



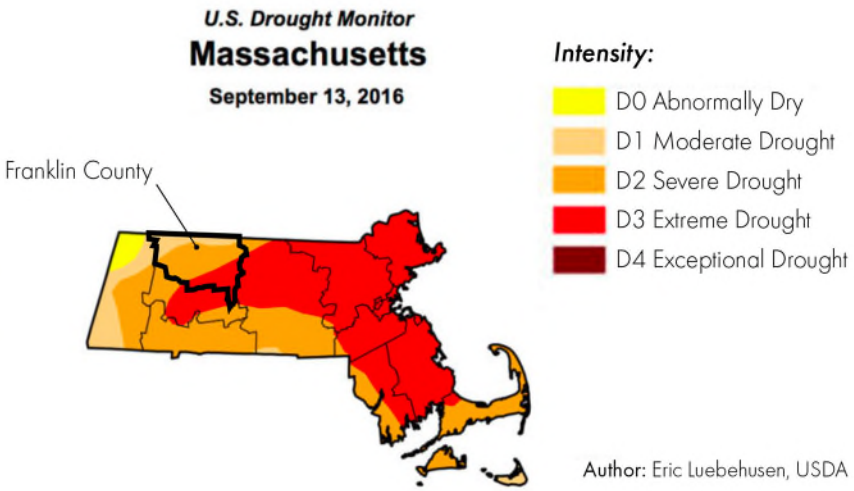
The above graph demonstrates temperature changes in Massachusetts between the years 1900 and 2100. Temperature projections for the rest of the 21st century are based on models used by the International Panel on Climate Change (IPCC) and two scenarios of future greenhouse gas emissions: 'medium' and 'high.' A 'medium' scenario (shown in the graph as "Lower Emissions") assumes a peak in global greenhouse gas emissions around 2050, which then declines rapidly over the second half of the century due to carbon reduction efforts. A 'high' scenario assumes a "business as usual" continuation of the current emissions course. These scenarios represent different pathways that society may or may not follow, to reduce emissions through climate change mitigation measures. For more information, see http://resilientma.org/resources/resource::2152

[8] Ibid.
[9] Ibid.



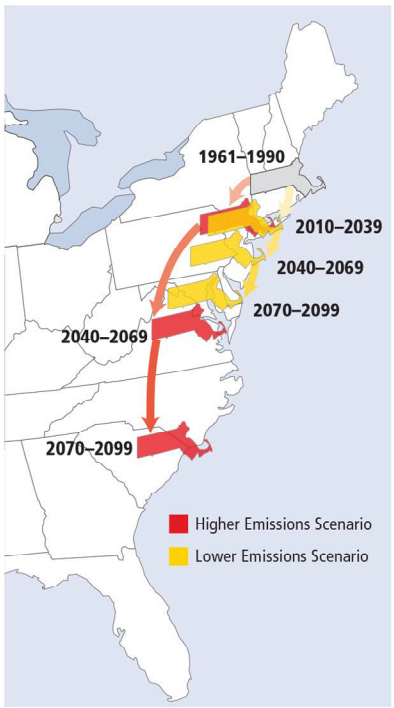
The temperature projections shown in this graph have been localized to accuracy at the watershed scale, by researchers from the Northeast Climate Science Center at the University of Massachusetts, Amherst. These highly valuable projections demonstrate how the climate is likely to transform in the Connecticut River Watershed over the course of the 21st century, based on climate models used by the IPCC and 'Medium' and 'High' emissions scenarios, as defined above. See http://resilientma.org/resources/resource::2152 for more information.

In the summer of 2016, Massachusetts was gripped with the worst drought conditions in recent memory. The prolonged period of warm, dry weather served as a stark reminder of how residents, communities, and industries depend upon the Commonwealth's fresh water resources. On September 21 of that year, the U.S. Department of Agriculture designated Franklin County, along with most other parts of the state, as primary natural disaster areas due to the ongoing drought and its effect on agriculture. A small projected decrease in average summer precipitation could combine with higher temperatures to increase the frequency of episodic droughts in the future.



Droughts will create challenges for local water supplies by reducing surface water storage and the recharge of groundwater supplies, including private wells. Droughts can weaken tree root systems, making them more susceptible to topping during high wind events. More frequent droughts can also exacerbate the impacts of flood events by damaging vegetation that could otherwise help mitigate flooding effects. (http://resilientma.org/resources/resource::2152)

Projected Summer Temperatures in Massachusetts by 2099



Changes in average summer heat index will strongly alter how summer feels to residents in the Northeast. Red arrows in the above map track what summers in Massachusetts could feel like over the course of this century in the higher emissions scenario. Yellow arrows track what Massachusetts could feel like on a lower emissions pathway. Source: Union of Concerned Scientists (2006).

The growing season (last frost in spring to first frost in fall) has roughly extended from May 8 to October 1, but varied greatly with topography. The long-term average historically is 146 days.

Changing weather patterns have already begun to affect the frequency, intensity, duration and geographic extent of extreme weather. As the weather continues to change over the coming decades, the following can be expected:

- Higher temperatures
- Shorter winters
- More frequent & intense storms
- Droughts

The number of days with temperatures over 90^{o} are predicted to increase. Annually, the Connecticut basin is expected to see days with daily maximum temperatures over 90 °F increase by 10 to 35 more days by mid-century, and 15 to 76 more days by the end of the century. Seasonally, summer is expected to see an increase of 8 to 30 more days with daily maximums over 90 °F by mid-century. By end of century, the Connecticut basin is expected to have 12 to 60 more days over 90 °F.[10]

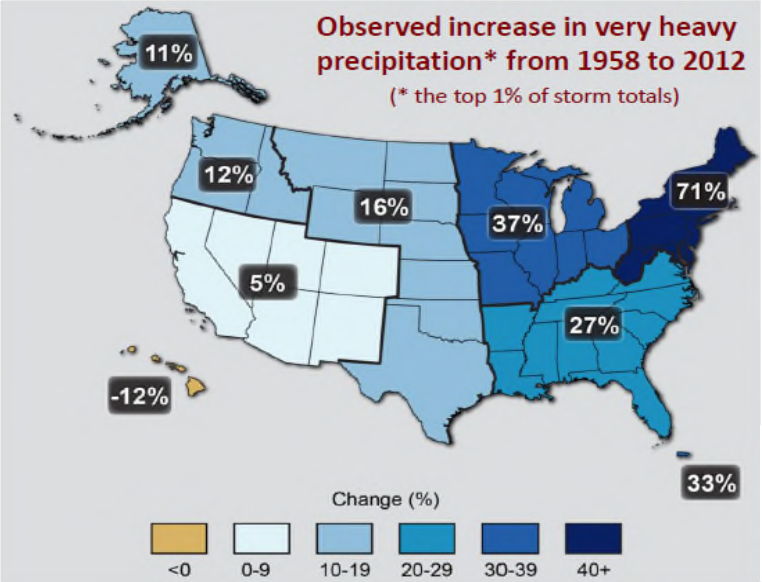
Increased demand could strain energy infrastructure and increase the potential for widespread brownouts or blackouts to disrupt service. Higher temperatures will likely require more frequent maintenance to address deterioration of asphalt roads, buckling of railroad tracks, and thermal expansion of bridges.

Between 1971 and 2000, our region experienced an average of 7 days with precipitation over 1". By the end of the century, it is predicted that Western Massachusetts could have 5 additional days of rainstorms that dump over 1 inch of rain over the course of the year. On October 29 and 30, 2017, Franklin County experienced 2+ inches of rain and 40 to 50 mph winds due to moisture associated with the remnants of Tropical Storm Philippe, causing localized flooding and downed power lines.

Figure 4-1 below illustrates the observed increase in very heavy precipitation from 1958 to 2012. New England has experienced a striking increase of 71% over this period, nearly twice the next highest increase of 37% in the Midwest.

[10] Ibid.

Figure 4-1. Observed Increased Precipitation



Source: https://nca2014.globalchange.gov/report/our-changing-climate/heavy-downpours-increasing

Previous climate studies have been based on the premise that the extreme rainfall series do not change through time. Therefore it is assumed that older analyses reflect current conditions. Recent analyses show that this is not the case, particularly in New York and New England where the frequency of 2 inch rainfall events has increased since the 1950s and storms once considered a 1 in 100 year event have become more frequent. Such storms are now likely to occur almost twice as often.[11] Environmental impacts that are anticipated to result from increased precipitation include:

- Flooding
- Erosion
- Impacts to water quality and quantity
- Loss of species diversity
- Invasive pests and plants
- Wetland soils becoming less absorptive
- More stormwater runoff, and less groundwater recharge

The drought of 2016 was a reminder of the widespread impacts droughts can have on our region. In addition to impacting the water quality and quantity of rivers, streams and other water bodies, drought can fuel wildfires.

The health of the town's natural resources directly affects the climate change resiliency of the municipal infrastructure, public safety and economic and physical welfare of watershed residents. Societal risks associated with changing weather include:

- Heat-related illness and death
- Danger from storms & flooding

[11] Northeast Regional Climate Center (NRCC) and Natural Resources Conservation Service (NRCS), Cornell extreme precipitation tool: http://precip.eas.cornell.edu/

- Insect-borne diseases
- Allergies & Pollen
- Waterborne disease & algal blooms
- Vulnerable populations

Maintaining healthy and intact wetlands, floodplains, riparian corridors, forests and other vegetated open spaces will help to mitigate the impacts from severe storm events and flooding. To assist with this, Northfield has applied for a Municipal Vulnerability Preparedness (MVP) Planning Grant. If awarded funding, the Town will be able to assess its strengths and vulnerabilities to climate change and identify projects that will improve the Town's resiliency. In addition, the Town will be updating its Multi-Hazard Mitigation Plan, which evaluates the Town's risks from various hazards such as flooding and hurricanes and recommends ways to minimize the damages to infrastructure, as well as natural, cultural, and historic resources.

B. TOPOGRAPHY, GEOLOGY, AND SOILS

Decisions about land use must take into consideration the inherent suitability of a site for different kinds of development. Information about the Town's geology, soils, and topography are essential to determining potential sites for future residential, commercial and industrial development and for new parks, hiking trails and open space.

Topography

The topography of the Town of Northfield is one of sharp contrast. Along the Connecticut River, which bisects the northern half of town and forms the western border of the southern half, the valley is quite broad, consisting of floodplain and glacial lake bottom. These lowlands were once the site of glacial Lake Hitchcock, which inundated the Connecticut River Valley from southern Vermont to central Connecticut. Much of Northfield's prime farmland soils can be found here. At a higher level above the river are additional alluvial deposits consisting of sand, gravel, hardpan, and some ledge outcroppings. The Connecticut River's tributaries, formed at the end of the Ice Age, created this level. To the east and west of these terraces, the topography gradually begins to rise to that of forested hills, which range in elevation from 500 feet to just over 1,500 feet. The highest elevations occur in eastern Northfield with Crag Mountain, located near the Town's southern border, dominating the landscape at 1,503 feet. Other notable peaks in eastern Northfield include the Upper Bald Hills (1,345 feet), Notch Mountain (1,319 feet), First Bald Mountain (1,276 feet), and Great Hemlock (1,255 feet).

Bedrock Geology

The Town of Northfield is the result of millions of years of geologic history: great upheavals of the earth's crust and volcanics, and the sculpting power of moving water, ice and wind. This distinctive physical base has determined the distribution of the town's water bodies, its soils and vegetation and its settlement patterns, both prior to and since colonial times. Understanding Northfield's current landscape requires a brief journey back in time and a review of some basic geological concepts.

The earth's crust is a system of plates whose movements and collisions shape the surface. As the plates collide, the earth's crust is compressed and forced upward to form great mountain ranges. In the northeastern United States, the plates move in an east-west direction, thus the mountains formed by their collisions run north to south.

The pressure of mountain building folded the earth, created faults, and produced the layers of metamorphosed rock typically found in New England. Collision stress also melted large areas of rock, which cooled and hardened into the granites that are found in some of the hill towns in Massachusetts today. Preceding the collisions, lines of volcanoes sometimes formed, and Franklin County shows evidence of this in bands of dark rock, known as schist, which was created as lava flows and volcanic ash were buried and subjected to high temperatures and pressure.

Dry Hill Gneiss and Poplar Mountain Gneiss, which are two rock units that can be seen locally, are part of a larger feature named the Pelham Dome, a large upland of Precambrian rock stretching from Northfield south to Belchertown. These rocks were not formed in or on North America, but rather were deposited on Gondwanaland, a separate continent made up of present-day Africa and South America. The exotic rocks, locally called the Gander Terrane, broke from Gondwanaland and collided with North America during the Salinic Orogeny (440-420 million years ago).

By the early Mesozoic (~250 million years ago) motions of the tectonic plates had formed the supercontinent Pangea with all the major continents connected into one huge landmass. What is now northwest Africa was juxtaposed next to eastern North America. Pangaea began to break apart almost 200 million years ago, with North America moving westward and Africa and Europe moving eastward as the continents drifted away from each other. This "continental drift" caused earthquakes and formed large rift valleys, the largest of which became the Atlantic Ocean. The Connecticut Valley is one of several rifts that formed during continental stretching. Streams flowing into the river from higher areas brought alluvium, including gravels, sand and silt. At the time, the area that is now the Town of Northfield was located south of the equator. The Dinosaur era had begun, and the footprints of these giant reptiles are still visible in the rock formed from sediments deposited on the valley floor millions of years ago.

By the close of the Dinosaur age, the entire eastern United States, including Northfield, was part of a large featureless plain, known as the peneplain. It had been leveled through erosion, with the exception of a few higher, resistant areas. Today, these granite mountaintops, called monadnocks, are still the high points in this region. Local examples include Mt. Wachusett, Mt. Greylock, and Mt. Monadnock in New Hampshire.

As the peneplain eroded, the less resistant rock eroded to form low-lying areas, while bands of schist remained to form upland ridges. By this time, the Connecticut Valley had been filled with sediment, while streams that would become the Deerfield, Westfield, and Farmington Rivers continued to meander eastward. The westward-flowing streams would become more significant later on.

A long period of relative quiet in geologic terms followed the Dinosaur era. Then, as the Rocky Mountains were forming in the west eight million years ago, the eastern peneplain shifted upward a thousand feet. As a result of the new, steeper topography, stream flow accelerated, carving deep

valleys into the plain. Today, the visible remnants of the peneplain are the area's schist-bearing hilltops, all at about the same 1,000-foot elevation.

Looking northeast from Crag Mountain *(Julia Blyth)*

Mountain building, flowing water, and wind had roughly shaped the land; now the great glacial advances would shape the remaining peneplain into its current topography. Approximately two million years ago, accumulated snow and ice in glaciers to the far north began advancing under their own weight. A series of glaciations or "ice ages" followed, eroding mountains and displacing huge amounts of rock and sediment. The final advance, known as the Wisconsin Glacial Period, completely covered New England before it began to recede about 13,000 years ago. This last glacier scoured and polished the land into its final form, leaving layers of debris and landforms that are still distinguishable.

The glacier picked up, mixed, disintegrated, transported and deposited material in its retreat. Material deposited by the ice is known as *glacial till*. Material transported by water, separated by size and deposited in layers is called *stratified drift*. The glacier left gravel and sand deposits in the lowlands and along stream terraces. Where deposits were left along hillsides, they formed kame terraces and eskers. Kames are short hills, ridges, or mounds of stratified drift, and eskers are long narrow ridges or mounds of sand, gravel, and boulders.

During the end of the last ice age, a great inland lake formed in the Connecticut River Valley. Fed by streams melting from the receding glacier, Lake Hitchcock covered an area approximately 150 miles long and twelve miles wide, stretching from St. Johnsbury, Vermont to Rocky Hill, Connecticut. Streams deposited sand and gravel in deltas as they entered the lake; smaller silts and clays were carried into deeper waters.

Surficial Geology

Most of Northfield's surficial geologic features were formed in the last 20,000 years during the waning stages of the last glacial advance (the Wisconsin period) and the time that has elapsed since the disappearance of the ice. This time interval can be conveniently subdivided into three stages: (1) the last stages of glacial ice advance through central New England (20,000 to about 15,000 years ago); (2) a period of time when the ice front retreated and glacial melt waters redistributed the pulverized rock carried by the glacier (15,000 to about 13,000 years ago); and (3) the last 13,000 years when weathering processes (frost wedging and chemical weathering) along with the action of streams have made slight modifications to the landscape remaining after

the glacial retreat. The second of these time periods (although the briefest) had the most influence on the Northfield landscape.

Glacial Advance

The predominant legacy of the glacier itself is the rounded hills of the town. Though chemical weathering has destroyed most examples of glacial scratches, the shapes of the hills themselves indicate they were sculpted by ice moving in a generally southeasterly direction. The northwest sides of most hills (known as *roches moutonnées*) are gentler than their southeast slopes. These hills were polished by the ice on their "upstream" sides and plucked on the "downstream" sides, creating steep cliffs. The cliffs of Northfield, including Brush Mountain and Crag Mountain – were probably formed in this fashion. These hills were most likely stripped of soil and left as bald knobs as the ice retreated, resulting in unusually low soil depths at these hilltops.

Another clear imprint of the former glacier is seen in depressions left in the bedrock surface. The upland swamps that dot the town in places like Satan's Kingdom and Stephen's Swamp are manifestations of these depressions. Less dramatic, but certainly more pervasive, is the till cover left by the ice. Till is a mix of clay, sand, and rocks jumbled together by the bulldozing action of glacier ice. It forms heavy and poorly drained soils. In contrast, areas covered by glacial outwash usually have much more sand and gravel with well-drained soils. Areas dominated by till (as opposed to gravelly outwash) can be distinguished by stonewalls built of large rocks removed from fields if the land had formerly been used for agriculture.

Glacial Retreat

One of the most dramatic parts of the town's surficial geologic history was written during the relatively brief retreat of the glacial front northward up the Connecticut River Valley. Movement of surficial materials was far more rapid than it is today because very large quantities of water were discharged by the melting ice and the ground was strewn with debris upon which little vegetation had taken hold. As the glacial front retreated northward across town, each part of the surface took its turn being at the ice front. The retreat may not have been uniform in its rate; there is some indication that the ice may have paused in places during its retreat.

Post-Glacial Landscape Modification

Relatively little has occurred in the past 14,000 years to further modify the landscape. Weathering, both chemical and mechanical, has degraded the glacially polished bedrock and smaller rock fragments in the till, creating the relatively thin soil cover that characterizes the upland areas of the town. Downslope movement of soil and till has probably left hilltops with even less soil cover than they had when the glacier left. Glacial outwash surfaces have become dissected by streams. Frost wedging has probably loosened boulders from cliffs like those on Brush Mountain. The pace of soil removal from town by the action of streams and wind erosion was probably accelerated by agricultural practices over the past two hundred years.

Soils

Soils sustain a diverse array of plant and animal life through the banking of nutrients and organic matter. They retain and release groundwater, and they produce food and a way of life for local residents. Wetland and riparian soils help to naturally regulate surface water flow and also provide habitats for some of the area's most unique species.

All soils have characteristics that make them more or less appropriate for different land uses. Scientists classify soils by these characteristics, including topography; physical properties including soil structure, particle size, stoniness and depth of bedrock; drainage or permeability to water, depth to the water table and susceptibility to flooding; behavior or engineering properties, and biological characteristics such as presence of organic matter and fertility (Natural Resource Inventory for Franklin County, University of Massachusetts Cooperative Extension; May 1976). Soils are classified and grouped into associations that are commonly found together.

As Northfield plans for the long-term use of its land, residents should ask: 1) which soils constrain development given current technologies? 2) Which soils are particularly suited for recreational opportunities and wildlife habitat? and 3) Which soils are best for agriculture? The answers to these questions can help lay a foundation for open space and recreation planning in Northfield. The following sub-section provides a description of the soils in Northfield based on their impact on development, recreation opportunities, wildlife habitat, and agriculture.

Which soils constrain development given current technologies?

Three soil associations found in the Town of Northfield have the potential to constrain development. They include:

- The silty Hadley-Winooski-Limerick soils are found in the floodplains of the Connecticut River in Northfield. Due to their location, they are subject to flooding and can have a high water table for most of the year.
- The Hollis-Charlton soils, found on the slopes of rolling to steep wooded hills, are located in West Northfield. They have a shallow depth to bedrock and there is the presence of hardpan in places. Ledge can also be present.
- The Shapleigh-Essex-Gloucester association, found in the uplands of eastern Northfield, presents constraints to development primarily due to the shallow depth to bedrock, however, steepness of slopes (15 percent to greater than 25 percent) can also be problematic.

Which soils are particularly suited for recreational opportunities and wildlife habitat?

Different recreational uses are constrained by different soil and topographical characteristics. Sports fields require well-drained soils and level topography, whereas lands with slopes greater than 25 percent are attractive to wildlife and to outdoor recreation enthusiasts such as hikers, mountain bikers, and snowshoers.

The soils of Northfield that are able to support certain recreation activities are the Hollis-Charlton association in West Northfield and the Shapleigh-Essex-Gloucester association in the hills of

eastern Northfield. The Hollis-Charlton association is generally found in rolling to steeply wooded hills greater than 400 feet in elevation. These soils formed in stony, sandy glacial till. The Hollis soils, found mostly on the steeper slopes, are somewhat excessively drained and shallow. The Charlton soils are on the upper slopes and hilltops, and are deep and well drained. The Shapleigh-Essex-Gloucester association is found on forested, rolling hills above 500 feet in elevation. The soils formed in sandy, gray glacial till, are stony with many large boulders. The Shapleigh soils are shallow and are found on the steeper slopes with many rock ledges and outcrops. The Essex and Gloucester soils are similar. They are both well drained and are found on the upper parts of the hills. They differ in that the Essex soils have a hard layer at approximately twenty-four inches in depth.

Which are the best soils for agriculture?

The Natural Resources Conservation Service (NRCS), formerly known as the Soil Conservation Service of the U.S. Department of Agriculture is responsible for classification of soils according to their suitability for agriculture. NRCS maintains detailed information on soils and maps of where they are located.

NRCS defines prime farmland as the land with the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and that is available for these uses. Prime soils produce the highest yields with the fewest inputs, and farming in these areas results in the least damage to the environment. Unique farmland is land other than prime farmland used for the production of high-value food and fiber crops. Unique farmland has a special combination of soil quality, location, growing season and moisture supply. These agricultural soils are a finite resource. If the soil is removed, or the land is converted to another use, the capacity for food and fiber production is lost.

Prime farmland soils have contributed to the town's economy throughout its history and continue to be in use throughout the town today. The soils that constitute Northfield's prime and unique agricultural land include the Hadley-Winooski-Limerick association and the Hinckley-Windsor-Merrimac soils. The Hadley-Winooski-Limerick association is found on the floodplains along the entire length of the Connecticut River in both the eastern and western portions of Northfield. The soils are generally silty and free of stones. The Hadley soils are well drained and are located on small knolls and terraces. The Winooski soils are moderately well drained and are found in the more level areas, whereas the Limerick soils are located in depressions and are poorly drained. Due to their high nutrient content, these soils are considered the most productive soils for farming in Northfield and the remainder of the Connecticut River Valley in Franklin County. The Hinckley-Windsor-Merrimac association is found on the level to rolling terraces parallel to the Connecticut River. The Hinckley soils, which dominate this association, are droughty and have formed in deep sandy and gravelly deposits. Gravel can be found within a foot and a half of the surface and sometimes on the surface itself. The Windsor soils are droughty and located on deep sand deposits. The Merrimac soils are similar to the Hinckley soils. They are somewhat droughty, but the subsoil is sandy loam with the gravel layer found more deeply, approximately two feet from the surface. The Hinckley-Windsor-Merrimac soils are best suited for dairying and several types of cash crops and are also considered important recharge areas for groundwater.

C. LANDSCAPE CHARACTER

The diverse landscape character of the Town of Northfield distinguishes it from surrounding communities. The town is one of open farmland, forested hills, numerous streams, wetlands and wildlife. The Connecticut River, a dominant feature within the town, runs through the central portion of northern Northfield and defines the western boundary of the southern portion. Much of the town's prime agricultural lands, which historically have afforded residents the opportunity for farming, can be found within the Connecticut River floodplain. Occupying approximately two-thirds of the town, the forested uplands of eastern Northfield and the northwest sector are another outstanding feature in the Town of Northfield.

D. WATER RESOURCES

Northfield is rich in water resources, including brooks, streams, ponds, vernal pools, wetlands, and aquifers *(see the Water Resources Map at the end of this Section).* The abundance of water resources is also reflected in the mostly reliable availability of groundwater for private and public wells. As described in Section 3, Northfield attracted a number of water-driven mills, though at a smaller scale than neighboring towns due to less waterpower comparatively. This section focuses on waters within the Town of Northfield, but it is important to keep in mind improvements in water quality in the rivers, brooks and streams in town have an impact beyond town borders.

Most wetlands are protected by the Massachusetts Wetland Protection Act (1963) that requires property owners to seek approval from the Conservation Commission for certain activities (e.g., home construction, out-buildings, and clearing of vegetation) in or within one hundred feet of wetlands. Individuals seeking to do work in or near wetlands are advised to contact the Commission for details on what types of approvals are necessary to comply with the law. The 1998 Rivers Protection Act stipulates that landowners must seek similar approvals for work within two hundred feet of perennial rivers and streams. Additionally, the local Zoning Bylaw includes a Flood Plain Overlay District, and Water Supply Protection District that restrict activities within these overlay areas in order to protect these important resources.

Watersheds

Connecticut River Watershed

Land in the town drains into two watersheds, the Connecticut River Watershed and one of its sub-watersheds, the Millers River Watershed. Most of the Town of Northfield is situated entirely within the Connecticut River Watershed, which is the largest river ecosystem in New England. It encompasses approximately 11,000 square miles and flows from its headwaters of Fourth Connecticut Lake in New Hampshire at the Canadian border to Long Island Sound at Old Lyme, Connecticut. The River travels through Massachusetts entering the Commonwealth at Northfield, draining all or part of forty-five (45) municipalities before entering the State of Connecticut. The watershed is 80 percent forested, 12 percent agricultural, 3 percent developed and 5 percent wetlands and water.

The Connecticut River Watershed is home to many species including nine federally listed endangered, threatened, or candidate species. These include the piping plover, shortnose sturgeon, dwarf wedge mussel, puritan tiger beetle, Jesup's milk-vetch, Robbin's cinquefoil, small whorled pogonia, and the northeastern bullrush. (The bald eagle (2007) and the peregrine falcon (1999), have been de-listed due to recovery of the species.)[12]

The Connecticut River has a "Class B" water quality designation from the New Hampshire-Vermont border to Holyoke and is classified as a warm water fishery. Class B waters are supposed to provide suitable habitat for fish and other wildlife and to support primary contact recreational activities such as fishing and swimming. The water should also be suitable for irrigation and other agricultural uses. The classification of rivers and streams in Massachusetts does not necessarily mean that the river meets that classification; rather, classifications represent the State's goal for each river.

According to the Massachusetts 2016 Integrated List of Waters[13], the Connecticut River from the New Hampshire/Vermont state line down to the Turners Falls dam is impaired by polychlorinated biphenyls (PCBs) in fish tissue, other flow regime alterations, and alteration in stream side or littoral vegetative covers. Additionally, there has been sampling for *E.coli* by the Greater Northfield Watershed Association and Connecticut River Conservancy (CRC) bi-weekly from 2014-2019 because of heavy recreational use. *E. coli* is a bacteria found in all warm-blooded animals, including humans. The CRC tests for *E. coli* as an indicator for the presence of other pathogens that may cause waterborne illnesses to those swimming, wading, or boating[14].

The Connecticut River is impaired by polychlorinated biphenyls (PCBs) along its total length and by *E. Coli* and Total Suspended Solids from Turners Falls Dam to its confluence with the Deerfield River. A report published in January 1998 by the New England Interstate Water Pollution Control Commission (NEIWPCC) listed bioaccumulation and toxicity as water quality issues for the entire length of the Connecticut River in Massachusetts. Bioaccumulation refers to the concentration of toxins in organisms at higher levels in the food chain. The report specifically identified PCBs in fish. In 2019, as it has for previous years, the Massachusetts Department of Public Health, Bureau of Environmental Health issued the following fish consumption advisory: "(All towns between Northfield and Longmeadow)… Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB."

Although wastewater treatment facilities constructed throughout the watershed have been treating major pollution discharges for more than twenty years, the Connecticut River is still affected by pollution from combined sewer overflows, PCBs, chlorine heavy metals, erosion, landfill leachate, storm water runoff and acid rain. Long Island Sound has a "dead zone" from too much nitrogen being discharged into the Sound, and over the next several years, Massachusetts may be required to make additional efforts to reduce nitrogen inputs into the Connecticut River and its tributaries. These pollutants come from both point sources, like wastewater treatment plants and

[12] U.S. Fish and Wildlife Service, https://www.fws.gov/refuge/Silvio_O_Conte/wildlife_and_habitat/endangered.html
[13] http://www.mass.gov/dep/ water/resources/10list6.pdf, accessed January 15, 2020.
[14] https://connecticutriver.us/it-clean, accessed January 15, 2020.

manufacturing plants, and non-point sources, including failed residential septic systems, improperly managed manure pits and stormwater runoff carrying herbicides.

According to the Connecticut River Five-Year Action Plan 2002-2007 developed by the Massachusetts Executive Office of Environmental Affairs, the Town of Northfield lies in the most rural portion (the Northern Reach) of the Connecticut River Watershed in Massachusetts. Important characteristics of this part of the watershed include agricultural lands, large tracts of forestland, and the presence of two hydroelectric facilities, including the Northfield Mountain Pumped Storage facility owned by FirstLight Power Resources. The Plan lists the following objectives for the Northern Reach:

- Increase awareness of the importance of riparian buffers along the mainstem of the Connecticut River and its tributaries;
- Reduce human-influenced erosion along the mainstem and its tributaries;
- Restore vegetative riparian buffers where appropriate;
- Protect water quality through the implementation of growth management strategies;
- Obtain additional water quality data;
- Reduce non-point source pollution with a particular focus on the mainstem and four priority tributaries including Bennett Brook and Four Mile Brook in Northfield;
- Assist communities with the protection of drinking water resources;
- Improve fish passage;
- Encourage the protection of important wildlife habitat;
- Complete an updated inventory of existing boat access points;
- Implement an education program for boaters; and
- Assist with the development of a public access point on the Fall River in Bernardston.

Federal Energy Regulatory Commission (FERC) licenses for two hydropower projects on the Connecticut River in Massachusetts, Turners Falls Dam, and Northfield Mountain Pumped Storage Project, expired in 2018. The FERC re-licensing process began in the fall of 2012 and is ongoing. FirstLight should use this process to address the impacts of project operations on recreation, open space, water quality, flow, erosion, and fisheries resources. The Town of Northfield is participating in the relicensing process and is working with other stakeholders to advocate for license requirements that mitigate environmental impacts and restore and enhance recreation amenities. FirstLight should be proposing significant investments in recreation resources that reflect the Town's needs and support the local and regional economies and recreation needs for the life of the FERC license, which will be in effect through 2070. This is truly a "once in a lifetime" opportunity for the Town's voice to be heard in the FERC relicensing process. As part of the FERC process, the MassDEP will issue a 401 Water Quality Certificate (401WQC) permit for each of the two FirstLight projects (it could be one permit for both but this depends on how FirstLight structures their 401WQC permit application). There are multiple opportunities in the coming 12-18 months for stakeholders in the Town of Northfield to continue advocating for the river, for the protection of valuable prime farmland and riparian and aquatic habitat and recreation resources. The Town

should continue working closely with the FRCOG and other local and regional stakeholders during the FERC and 401WQC permitting processes to ensure that the Town's voices are heard.

Millers River Watershed (sub-watershed of the Connecticut River)

The Town of Northfield is located in the western portion of the Millers River Watershed. A small area of the town drains into the Millers River Watershed. Most of the land is in the Northfield State Forest. Keyup Brook and Jacks Brook are the two streams with headwaters in Northfield. Jacks Brook flows into Keyup Brook in Erving and Keyup empties into the Millers River in Erving.

The 2016 Integrated List of Waters list five (5) miles of Keyup Brook from its headwaters in Northfield State Forest as impaired for PCB in fish tissue and E.Coli.

Surface Water

Rivers and Streams

MassGIS's 2016 land cover data identified 690 acres of surface waters covering 3% percent of the surface area of the Town of Northfield, consisting of a number of rivers, streams, and ponds. A number of these rivers and streams have habitat for rare and endangered species that are affected by nonpoint source pollution and can be protected through good open space management and acquisition of lands where these species exist.

According to Massachusetts Division of Fisheries and Wildlife, there are a total of twelve Coldwater Fisheries Resource (CFR) streams in Northfield; 10 in the Connecticut River Watershed, and 2 in the Millers River Watershed:

Connecticut River Watershed

1. Four Mile Brook
2. Merriam Brook
3. Roaring Brook
4. Millers Brook
5. Bennett Brook
6. West Wait Brook
7. Mill Brook
8. Minot Brook
9. Louisiana Brook
10. Pauchaug Brook

Millers River Watershed

1. Jacks Brook
2. Keyup Brook

According to the Massachusetts Division of Fisheries and Wildlife (MassWildlife), cold water fish resources (CFRs) are particularly sensitive habitats. Changes in land and water use can reduce the ability of these waters to support trout and other kinds of cold water fish. Identification of CFRs are based on fish samples collected annually by staff biologists and

technicians. MassWildlife updates the list of CFRs in the State on an annual basis and maintains an interactive map online. Conservation Commissions, planning boards, land trusts, regional planning agencies, and town open space committees can refer to the list and map of CFRs to better inform conservation planning.[15]

Surface Water Resources in the Connecticut River Watershed

In the eastern portion of Northfield:

Pauchaug Brook

Pauchaug Brook is located in northeastern Northfield. It originates in Winchester, New Hampshire just north of Warwick, Massachusetts. The brook supplies Wanamaker Lake on its generally westerly flow to its confluence with the Connecticut River, slightly north of the Pauchaug Meadow boat access ramp. The lower portion is located within the Pauchaug Meadow Wildlife Management Area. The brook is stocked with trout by the Mass. Division of Fisheries and Wildlife each spring.

Louisiana Brook

Louisiana Brook originates in the area of Louisiana and Notch Mountains in northeastern Northfield. The brook is dammed near its headwaters to create the Grandin Reservoir, which is a community water supply serving the former Northfield campus of the Northfield Mount Hermon School and surrounding neighborhoods. The brook flows in a westerly direction from the reservoir to its confluence with Pauchaug Brook just below Wanamaker Lake.

Mill Brook, wetlands and pond

Mill Brook originates in Bass Swamp in the Town of Warwick. It initially flows southwesterly along Warwick Road and makes a turn to the northwest as it approaches Northfield Village, reaching the Connecticut River in a series of cascades west of Main Street at Mill Road. The brook creates a large area of wetlands east of Main Street. Mill Brook is stocked with trout annually.

Minot Brook

Minot Brook is a tributary of Mill Brook and originates in Northfield State Forest in the eastern section of town. It flows westerly to its confluence with Mill Brook, northeast of the intersection of Warwick and Strowbridge Roads.

Millers Brook

Millers Brook is located in a beautiful ravine and originates in the area of Pratt Hollow, Stratton Mountain, and the Upper Bald Hills in eastern Northfield. It flows generally west southwesterly to its confluence with the Connecticut River in the area of Beers Plain.

Roaring Brook

[15] https://mass-eoeea.maps.arcgis.com/apps/webappviewer/index.html?id=56ddeb43ffc642feb3117ce7ebd1aa43

Roaring Brook is a tributary of Millers Brook and originates in the area of Brush Mountain, Roman T Hill and Beers Mountain. Roaring Brook flows west northwesterly to its confluence with Millers Brook near Route 63. There are several falls along Roaring Brook, two of which are notable, Sheep Falls and Salmon Falls. Salmon Falls was the site of a former grist mill and Sheep Falls was so named as the falls drop into a small pool that was once used for washing sheep prior to shearing. Roaring Brook is stocked with trout each spring.

Merriam Brook

Merriam Brook originates in the area of South Mountain and flows westerly to its confluence with the Connecticut River at the Munns Ferry campground.

Pine Meadow Brook

Pine Meadow Brook is a small stream that originates in the area of South Mountain. It flows into the Connecticut River near the southern end of Pine Meadow.

Fisher Brook

Fisher Brook is a tributary of Four Mile Brook. It originates in the area of Beers and South Mountains and flows southwesterly to its confluence with Four Mile Brook.

Four Mile Brook

Four Mile Brook originates atop Northfield Mountain near the town's border with the Town of Erving. It flows generally westerly to its confluence with the Connecticut River in the southwestern corner of Northfield. Four Mile Brook is stocked annually with trout by the Massachusetts Division of Fisheries and Wildlife.

Wanamaker Lake (former)

Wanamaker Lake used to be located along Pauchaug Brook in northeastern Northfield. The dam to the lake failed in 1997. It is now overgrown with Japanese Knotweed and other invasive species.

Unnamed Pond and Swamp near Center Cemetery

This swamp and the two-acre pond are located in Great Meadow near the Center Cemetery.

Perry Ponds

These are two ponds located on the grounds of the Northfield campus of Thomas Acquinas Campus.

There are numerous small ponds located throughout Northfield.

In West Northfield:

Bottom Brook

Bottom Brook originates in the uplands of West Northfield near the town's border with Vernon, Vermont. The brook flows generally southeasterly to its confluence with the Connecticut River at Moose Plain just north of the railroad bridge.

Mallory Brook

Mallory Brook originates in uplands just north of West Road and flows southeasterly to its confluence with the Connecticut River at the southern tip of Second Moose Plain.

East Wait Brook

East Wait Brook is a series of wetland areas connected by short sections of stream. The brook originates in wetlands in the northwest corner of West Northfield near the border of Vermont and drains into the wetlands area of Hell's Kitchen west of Lily Pond.

West Wait Brook

West Wait Brook originates in the northwestern corner of Northfield. It flows southeasterly through Northfield State Forest and drains into the wetlands area of Hell's Kitchen.

Bennett Brook

Bennett Brook flows out of the southern Sawyers Pond and travels southeasterly to its confluence with the Connecticut River at the southern end of Bennett Meadow.

Hell's Kitchen

Hell's Kitchen is a 40-acre wetland located off Vernon Road listed in the National Wetland Inventory. East and West Wait Brooks drain into the wetland and in turn, the wetland drains into the northern Sawyer Pond. Hell's Kitchen is part of the Satan's Kingdom Wildlife Management Area owned by the Massachusetts Department of Fish and Game.

Sawyer Ponds

Sawyer Ponds (privately-owned) are located in West Northfield at the southern end of Hell's Kitchen. The Hell's Kitchen swamp drains into the northern Sawyer Pond and Bennett Brook flows out of the southern pond. The southern pond is twelve acres in size, and the northern pond is nine acres in size.

Lily Pond

Lily Pond is located to the northeast of Hell's Kitchen.

Streeter Pond

Streeter Pond is a two to three acre shallow pond located on Route 142 in West Northfield.

Surface Water Resources in the Millers River Watershed

Keyup Brook

Keyup Brook originates in the area of Great Swamp in the portion of Northfield State Forest located in the southeastern corner of town. Keyup Brook flows southerly and is joined by Jack's Brook before flowing into the Millers River in the Town of Erving.

Jacks Brook

Jacks Brook originates in the area of the First Bald Hills in the southeastern corner of Northfield. It is a tributary of Keyup Brook, which flows into the Millers River in the Town of Erving.

Great Swamp

Great Swamp is located in the portion of Northfield State Forest located in the southeastern corner of town. Great Swamp is the headwaters for Keyup Brook and is listed in the National Wetland Inventory.

River Corridor Mapping and Management

Rivers and streams are dynamic systems in a constant state of change. Fluvial erosion is a natural process of wearing away 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. Sometimes buildings and roads are located too close to river banks and areas of active river processes, placing them at risk 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 in Buckland.

In 2019, the Franklin Regional Council of Governments (FRCOG) created a River Corridor Management Toolkit to provide communities help with delineating and managing river corridors. The tools outlined in the Toolkit can promote river restoration and protection, create climate resilient land uses, and reduce the harm to land, water, habitat, people, and infrastructure caused by increasingly severe and frequent flood events. They include a river corridor mapping protocol, examples of river restoration projects, a Model River Corridor Protection Overlay Zoning District, and a Model River Corridor Easement Restriction. Many of these new approaches to establishing and protecting river corridors are compatible with recreation.

Wetlands

Wetlands are transitional areas where land-based and water-based ecosystems overlap. Inland wetlands are commonly referred to as swamps, marshes and bogs. Technically, wetlands are places where the water table is at or near the surface or the land is covered by shallow water. Sometimes, the term wetland is used to refer to surface water as well.

Historically, wetlands have been viewed as unproductive wastelands, to be drained, filled and "improved" for more productive uses. Over the past several decades, scientists have recognized that wetlands perform a variety of extremely important ecological functions. They absorb runoff and prevent flooding. Wetland vegetation stabilizes stream banks, preventing erosion, and trap

sediments that are transported by runoff. Wetland plants absorb nutrients, such as nitrogen and phosphorus, which would be harmful if they entered lakes, ponds, rivers and streams. They also absorb heavy metals and other pollution. Finally, wetlands are extremely productive, providing food and habitat for fish and wildlife. Many plants, invertebrates, amphibians, reptiles and fish depend on wetlands to survive. Wetlands have economic significance related to their ecological functions: it is far more cost-effective to maintain wetlands than build treatment facilities to manage stormwater and purify drinking water, and wetlands are essential to supporting lucrative outdoor recreation industries including hunting, fishing and birdwatching.

Great Swamp at the headwaters of Keyup Brook in the Northfield State Forest (*Julia Blyth)*

In recognition of the ecological and economic importance of wetlands, the Massachusetts Wetlands Protection Act is designed to protect eight "interests" related to their function: public and private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, land containing shellfish, fisheries, and wildlife habitat. To this end, the law defines and protects "wetland resource areas," including banks of rivers, lakes, ponds and streams, wetlands bordering the banks, land under rivers, lakes and ponds, land subject to flooding, and "riverfront areas" within two hundred feet of any stream that runs all year. Local Conservation Commissions are responsible for administering the Wetlands Protection Act; some towns also have their own, local wetlands regulations.

Many of Northfield's wetlands are mapped by the National Wetlands Inventory (NWI) (*see the Water Resources Map at the end of this section*). MassGIS's 2016 land cover data identified 698

acres of wetlands in Northfield. Because of the town's rolling topography, most wetlands are connected by perennial or intermittent streams through the upland areas of town. Larger networks of varying wetland types can be found through the valley on both sides of the Connecticut River and in the center of town. Much of the rest is located in the Northfield State Forests and Satan's Kingdom Wildlife Management Areas, which are largely forested. Isolated wetlands (not connected to surface waters) represent a small percentage of Northfield's wetland acreage, although they are quite numerous.

Wetland Types

Several types of wetlands may be found in Northfield:

- Hemlock and white pine swamps (palustrine evergreen forested wetlands)
- Red maple swamps (palustrine deciduous forested wetlands)
- Deciduous shrub swamps (palustrine deciduous scrub-shrub wetlands)
- Shrub bogs (palustrine evergreen scrub-shrub wetlands)
- Wet meadows (palustrine emergent wetlands with a saturated water regime)
- Shallow marsh meadow or fen
- Marshes (palustrine emergent wetlands with a seasonally flooded to semi permanently flooded water regime)
- Deep Marsh
- Aquatic beds (lacustrine aquatic beds of floating-leaved and submerged plants)
- Vernal pools

Forested wetlands and shrub swamps are dominated by woody species. Besides the major species listed above (hemlock, white pine, red maple), forested wetlands may include several other trees (yellow birch, gray birch, green ash, and swamp white oak), a few shrubs (spicebush, high-bush blueberry, shadbush, and chokeberry), and some herbaceous plants including cinnamon fern, royal fern, skunk cabbage (most evident in spring and early summer), and tussock sedge.

Shrub swamps are represented by common winterberry, swamp rose, silky dogwood, northern arrow-wood, speckled alder, willows, poison sumac, common elderberry, and buttonbush. The latter two species may occupy large areas.

Shrub bogs formed on a substrate of peat moss contain several species including cranberries, leatherleaf, blueberries, sheep laurel, azaleas, sundews, northern pitcher plant, and a few orchid species. Herbaceous (non-woody) plants characterize wet meadows, marshes, and aquatic beds.

Mowed and/or grazed pastures with high seasonal water tables throughout most of the year are called wet meadows. Their wetness results largely from groundwater seepage. Typical meadow species include tussock sedge, other sedges, soft rush, marsh fern, swamp milkweed, boneset, Joe-Pye weed, purple loosestrife, sensitive fern, and marsh marigold. Some meadows may have peat mosses.

Marshes occur in depressions or along the shores of ponds. Common marsh plants include broad-leaved cattail and water-willow, with less common species like pickerelweed, arrowhead, and smartweeds.

Aquatic beds consist mainly of white water lilies (most evident in summer mornings), yellow pond lily, bladderworts, and pondweeds. Eurasian Milfoil (spike watermilfoil), *Phalaris arundinacea* (Reed canary-grass), *Phragmites australis ssp. australis* (Common reed), and *Potamogeton crispus* (Crisped pondweed) are some of the invasive species that have been observed since 2010 in wetland areas of Northfield.[16]

Vernal Pools

Vernal pools are temporary bodies of fresh water that provide critical breeding habitat for many vertebrate and invertebrate wildlife species. They are typically seasonal ponds surrounded by woodlands and are defined as "basin depressions where water is confined and persists for at least two months during the spring and early summer of most years, and where reproducing populations of fish do not survive." Some may contain plants such as blue flag iris, buttonbush, and clumps of high-bush blueberry on raised mounds. They are vital breeding grounds for several amphibians including salamanders (bluespotted, spotted, marbled, Jefferson), frogs (spring peeper, wood frog, and gray tree frog), the American toad and several invertebrates. Vernal pools may be very shallow, holding only 5 or 6 inches of water, or they may be quite deep. They range in size from fewer than 100 square feet to several acres (Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, *Massachusetts Aerial Photo Survey of Potential Vernal Pools*, Spring 2012).

Vernal pools are found across the landscape, anywhere that small woodland depressions, swales or kettle holes collect spring runoff or intercept seasonal high groundwater, and along rivers in the floodplain. Many species of amphibians and vertebrates are completely dependent on vernal pools to reproduce. Loss of vernal pools can endanger entire populations of these species.

The state's Natural Heritage and Endangered Species Program (NHESP) has predicted the location of vernal pools statewide based on interpretation of aerial photographs. NHESP believes that its method correctly predicts the existence of vernal pools in 80 to 90 percent of cases. They acknowledge, however, that the method probably misses smaller pools. The NHESP has identified approximately eighty potential vernal pools throughout Northfield with several clusters especially in the northwestern part of town. According to NHESP, clusters indicate particularly good habitat for species. Also, with clusters, there are alternate habitats if something happens to one pool, and slightly different conditions in each may provide different habitats for species dependent upon the pools.

In addition to identifying potential vernal pools, NHESP certifies the existence of actual vernal pools when evidence is submitted to document their location and the presence of breeding amphibians that depend on vernal pools to survive. Certified vernal pools are protected by the Massachusetts Wetlands Protection Act. According to MassGIS, there are about 19 NHESP Certified Vernal Pools in Northfield.

[16] Matthew Hickler, Botanist and Ecologist, Franklin County Flora Group. March 2019.

Beaver Dams

Beaver activity has been increasing over the past decade. Several wetland areas have been flooded by beaver dam construction. As a result, their vegetation has changed from forested wetland to marshy habitat. Sometimes beaver activity is detrimental to property, causing problems for local landowners (e.g., flooding of wells, septic systems, lawns, out-buildings, and roadways). Affected individuals must contact the Board of Health and Conservation Commission for advice and permission to alleviate beaver problems. Current locations where beavers are known to be active include Millers Brook near Captain Beers Plains Road, other beaver ponds in natural areas at Alderbrook Meadows, Pioneer Valley Regional School, and many others.

Aquifers

Water plays a very important role in supporting our communities, which use water every day for drinking, for disposal of our sewage, for irrigating croplands and lawns and for local industries. The cost of clean drinking water depends on its supply and the amount of effort that is invested in purifying it. Surface reservoirs often require expensive filtration plants that are monitored regularly by professionals. In comparison, aquifers contain water that enters the soils within a sub-watershed as precipitation and slowly infiltrates the ground water levels. This slow infiltration process helps to purify the water at little cost to the consumer. This is one way in which watersheds in their natural, vegetated state provide a valuable ecological service. Land naturally contributes to the hydrologic cycle by storing and releasing water. However, the manner in which land is used can hinder this ecological process by preventing water from infiltrating topsoil or by allowing contaminated water to leach into the groundwater. Protected open space can help preserve the integrity of aquifers by sustaining the land's natural water retention capacity and by reducing the areas covered by land uses that store, use, or distribute hazardous materials.

Non-point source pollution in Northfield can also impact drinking water. There is a direct link between above ground land use and below ground water quality. For example, lawns actually facilitate the movement of rainwater across the ground's surface instead of providing an easy entry point to the soil. Pavement produces even more runoff because it is impervious. Normally, as a community grows the amount of impervious surfaces increases. When precipitation runs off a surface like asphalt, the rainwater may pick up and carry contaminants into streams, ponds, lakes, and into the groundwater. Some of the groundwater moves through subsurface soil layers into streams, while other seeps down into aquifers. The Town could benefit from an effort to try to minimize the amount of impervious cover and find ways of diverting storm water runoff to retention areas so sediments and highway related pollutants can settle out before being transported to surface and ground waters. New subdivision regulations and standards for development could encourage the use of Low Impact Development (LID) techniques in new developments and when property owners retrofit buildings or redevelop parking areas or driveway configurations.

Aquifers are composed of water-bearing soil and minerals, which may be either unconsolidated (soil-like) deposits or consolidated rocks. Consolidated rocks, also known as bedrock, consist of rock and mineral particles that have been welded together by heat and pressure or chemical

reaction. Water flows through fractures, pores and other openings. Unconsolidated deposits consist of material from the disintegrated consolidated rocks. Water flows through openings between particles.

As water travels through the cracks and openings in rock and soil, it passes through a region called the "unsaturated zone," which is characterized by the presence of both air and water in the spaces between soil particles. Water in this zone cannot be pumped. Below this layer, water fills all spaces in the "saturated zone". The water in this layer is referred to as "groundwater". The upper surface of the groundwater is called the "water table" (Masters, Gilbert. *Introduction to Environmental Engineering and Science, Second Edition*; 1998).

The route groundwater takes and the rate at which it moves through an aquifer is determined by the properties of the aquifer materials and the aquifer's width and depth. This information helps determine how best to extract the water for use, as well as determining how contaminants, which originate on the surface, will flow in the aquifer.

Aquifers are generally classified as either unconfined or confined (EPA and Purdue U.; 1998). The top of an unconfined aquifer is identified by the water table. Above the water table, in the unsaturated zone, interconnected pore spaces are open to the atmosphere. Precipitation recharges the groundwater by soaking into the ground and percolating down to the water table. Confined aquifers are sandwiched between two impermeable layers (Masters; 1998). Almost all the public wells in Massachusetts, including those in Northfield, and many private wells tap unconfined aquifers (Mass. Audubon Society; 1985). Wells that rely on confined aquifers are referred to as "artesian wells."

According to MassGIS and US Geological Service (USGS) documents, Northfield has one large area considered to be medium-yield aquifer, defined as an aquifer with the potential to provide a pumping volume 25 to 1,000 gallons per minute. This aquifer extends along both sides of the Connecticut River in Northfield, with the exception of a small area between East Northfield Road and Elm Avenue. (*see Water Resources Map at the end of this section).*

The areas that contribute to public water supply wells are known as recharge areas. Potential sources of contamination of public and private wells include septic systems, sub-surface fuel tanks, manure piles, improper use, storage and disposal of hazardous materials, herbicide runoff from farmland, utility rights-of-way, state highway vegetation control, and road runoff.

The Massachusetts Department of Environmental Protection strictly regulates an area within a radius of 100 to 400 feet of public water supply wells, known as the "Zone I," and land uses in this area are restricted to water supply related activities only. Primary recharge areas are determined by hydrological studies involving pump tests and wells that monitor the level of groundwater in proximity to the public water supply well. The Northfield Water District's well has a Zone 1 radius of 400 feet around the wellhead. The District does not own the entire Zone I radius and as such, is considered to be non-conforming by the state. The Massachusetts drinking water regulations (310 CMR 22.00) require public water suppliers to own the Zone I or control the Zone by conservation restriction, and that only water supply activities be allowed. Since many water supplies were developed prior to the regulations, many are non-conforming. The Source Water

Assessment and Protection (SWAP) Report prepared by the Mass. Department of Environmental Protection indicates that within the Northfield Water District Zone I, there are activities which include pasturelands, residences and roads. These uses are considered potential sources of contamination.

The Northfield Water District also has a delineated Zone II recharge area. A Zone II is that area of an aquifer that contributes to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at approved yield with no recharge from precipitation). The Zone II is located west of the confluence of the Minot Brook and Mill Brook. Threats to the District's Zone II recharge area contributing to a designation of "high" threat of contamination include residential use, roadways, potential hazardous materials storage and use, presence of an oil contamination site as noted by DEP, and agricultural uses. The Northfield Water District's Zone II recharge area is 137.6 acres in size and roughly bounded by Birnam Road, Old Turnpike Road, Round Hill and Minot Brook, with Warwick Road roughly bisecting the area.

Flood Hazard Areas

Flooding along rivers is a natural occurrence. Floods happen when the flow in the river exceeds the carrying capacity of the channel. Some areas along rivers flood every year during the spring, while other areas flood during years when spring runoff is especially high, or following severe storm events. The term "floodplain" refers to the land affected by flooding from a storm predicted to occur at a particular interval. For example, the "one hundred year floodplain," is the area predicted to flood as the result of a very severe storm that has a one percent chance of occurring in any given year. Similarly, the 500-year floodplain is the area predicted to flood in a catastrophic storm with a 1 in 500 chance of occurring in any year.

The 100- and 500-year floodplains are mapped by the National Flood Insurance Program (NFIP) after a study of waterways. The 100-year floodplain is used for regulatory purposes. According to the NFIP maps effective in 1980, one hundred-year floodplains in Northfield occur along:

- The lowland areas along the entire length of the Connecticut River in Northfield including Pauchaug Meadow, Great Meadow, Little Meadow, Pine Meadow in eastern Northfield and Moose Plain, Second Moose Plain and Bennett Meadow in West Northfield;
- Pauchaug Brook from Wanamaker Lake to its confluence with the Connecticut River;
- Louisiana Brook from Route 10 to approximately one eighth mile upstream;
- The entire length of Mill Brook;
- Millers Brook from its confluence with the Connecticut River upstream to approximately one quarter mile past the intersection of Gulf and Alexander Hill Roads;
- Nearly the entire length of Roaring Brook;
- Four Mile Brook from its confluence with the Connecticut River to a point approximately 1.5 miles upstream;
- The entire length of Keyup Brook;

- East Wait Brook and associated wetlands, Sawyer Ponds, Lily Pond; and
- Bennett Brook.

Surface Water Reservoirs

The Grandin Reservoir is located off Louisiana Road in northeastern Northfield. Grandin Reservoir and its tributaries have been designated as Class A water sources by the Massachusetts Department of Environmental Protection. As such, these waters can be used as public water supplies. Class A water sources are also considered excellent habitat for fish, other aquatic life and wildlife. They have aesthetic value and are suitable for recreation purposes compatible with their designation as drinking water supplies. These waters are designated for protection as Outstanding Resource Waters under Massachusetts 314 CMR 4.04.

The Grandin Reservoir is owned by the Northfield Mount Hermon School (NMH) and currently serves the former Northfield campus as well as nearby neighborhoods. It has a storage capacity of 30 million gallons, an estimated safe yield of 200,000 gallons, and an area of approximately seven acres. The reservoir and some of its critical watershed is currently owned by NMH. The Source Water Assessment and Protection Report is available from MA Department of Environmental Protection. The East Northfield Water Company completed an updated watershed protection plan in 2011. The water is chlorinated after it is pumped from the reservoir.

The Grandin Reservoir has three protection zones, Zone A, Zone B and Zone C. Zone A, the most critical area for protections, is that area 400 feet from the edge of the reservoir and 200 feet from the edge of the tributaries draining into the reservoir. Zone B is that area one-half mile from the edge of the reservoir and does not go beyond the outer edge of the watershed. Zone C is the remaining area in the watershed not designated as Zone A or B. The Grandin Reservoir's Zones A and C are densely forested. NMH worked with DEP to do some forestry cutting in Zone A to re-establish smaller growth which provides added filtering for water entering the reservoir.

The Massachusetts Department of Environmental Protection (DEP) considers the threat of contamination to the Grandin Reservoir as moderate. The DEP identifies potential sources of contamination that include access roads, aquatic mammals, and forest operations.

E. VEGETATION

Plants are a critical component of ecosystems in Northfield. Plants convert solar energy into food, which supports all animal life. Plants cycle energy through the ecosystem by decaying, by removing carbon from the atmosphere and by shedding oxygen. Plants help moderate temperatures and act as shelter and feeding surfaces for herbivores, omnivores, and carnivores.

Information in this section and in *Section F: Fisheries and Wildlife* incorporates conservation mapping from the Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Wildlife and Fisheries. This conservation mapping program, BioMap2[17], was developed with the assistance of The Nature Conservancy "to protect the state's biodiversity in the context of projected effects of climate change," BioMap2 includes *Core Habitat*

[17] http://maps.massgis.state.ma.us/dfg/biomap2.htm, accessed January 15, 2020

areas, that are critical for long-term survival of rare species and other Species of Conservation Concern, natural communities and intact ecosystems, and *Critical Natural Landscapes*, which are large, natural, unfragmented landscape blocks that provide habitat, maintain connectivity, help to provide resilience to disturbances and provide buffers around some core habitats. (See *Scenic Resources & Unique Environments* maps at the end of this section).

Hiking on the New England Trail in the Northfield State Forest *(Julia Byth)*

Forests

The second highest natural resource goal in the *Franklin County 2035 Regional Plan for Sustainable Development (RPSD)* is to protect forests. Unfragmented forests, old-growth forests, and forests that support rare and endangered plant and animal species are especially valuable. Forests along rivers and streams are also a priority to protect for their important habitat, water recharge functions, and bank stabilization. Forests located on soils good for timber production should also be protected. The plan lists several potential impacts on forests due to climate change, including decline of maple syrup production, the deterioration of the Eastern Hemlock, and the spread of invasive species. In 2011, Northfield established a 150 acre Town Forest on the western slope of Brush Mt. with help from Mount Grace Land Conservation Trust with funding through the Forest Legacy Program. The Town Forest has a Forest Resource Management Plan.

74 percent of the land cover in Northfield is forested. Most of this forest land is managed as Northfield State Forest and Satan's Kingdom Wildlife Management Area and is owned by the Commonwealth of Massachusetts and the Town of Northfield. Timber harvesting in town also takes place on tracts owned by private individuals. These products fuel a timber economy that supports the "buy local" movement in the Pioneer Valley. Forests experience both "natural" and human-caused disturbances or stresses that have shaped**,** and will continue to shape**,** their development over time. Sustainable forestry practices that strike a balance between environmental protection and economic development also provide employment, support rural

communities, and encourage landowners to retain their woodlots rather than selling them. Benefits of management for a healthy forest include providing a sustainable source of wood products, increasing the diversity of habitats for wildlife, and offering places for recreation. Forestry management best practices also emphasize the value of emulating old-growth conditions[18] and limiting the fragmentation of forests to protect wildlife habitat.

The predominant forest type in Northfield is the transition hardwoods-white pine forest (USDA; 1992). Within this forest type, northern hardwoods such as yellow and paper birch (*Betula alleghaniensis* and *Betula papyrifera*), beech (*Fagus grandifolia*), and sugar and red maple (*Acer saccharum* and *Acer rubrum*) are the major species. On the dryer sites, oaks and hickories can be found with red oak (*Quercus rubra*) being the most abundant deciduous species. Hemlock (*Tsuga canadensis*) occurs in the moist cool valleys, north and east slopes, and sides of ravines in Northfield. White pine (*Pinus strobus*) is characteristic of the well-drained sandy sites. The transition hardwood-white pine forest type commonly occurs up to an elevation of 1,500 ft. above sea level in upland central Massachusetts and southern New Hampshire, northward through the Connecticut Valley. A mixture of different patches of forest generally provides a range of habitats, supports more wildlife species, and increases the resiliency and responsiveness of our forests.[19] Bird species requiring scrub or early successional forests are getting scarcer. Harvesting mature forest may be necessary to increase the habitat for these species beyond the areas under high tension lines. Insect, disease and storm damage to the forest can also be decreased through timber harvesting. The decline in early successional forests and habitat may be a result of the suppression of natural disturbances (including beavers, fire, etc.)

Species with weak wood such as birches, red maple, and aspen are more easily damaged by ice and wet snow. Species with greater structural integrity such as oaks and sugar maple benefit from the reduced competition in affected stands and move ahead in the race for light to assume dominance. Trees of any species that are structurally weak due to acute branching angles, forks, and crooks, and those that are shallow-rooted, are also more susceptible to wind and ice damage. Eastern white pine, often a multi-stemmed tree from repeated white pine weevil damage, suffers a disproportionate amount of damage from ice storms and wet snow.

Wind, ice, and snow can cause considerable economic damage to a forest. However, from an ecological perspective, a tree's misfortune often has a positive outcome for other organisms. Large broken limbs and other wounds create cavities in trees that are utilized by over fifty species of mammals and birds. These events can produce greater vertical structural diversity in a forest by creating small openings in which shrubs and smaller trees can develop. Drought also shapes forest composition but in a more subtle fashion. A drought in the summer of 2001 caused many marginal trees on exposed, dry sites to succumb to moisture stress. Western Massachusetts experienced another drought in 2016, and more extreme temperatures are expected to cause more frequent droughts in the future. A more drought-resistant community of trees will most likely replace the dead ones, and these species may become more common in the region as the climate shifts.

[18] Rankin and Perlut 2015.
[19] Millar et al 2007.

Insects and pathogens also have a profound influence on forests. Perhaps the most destructive event of that type in recent memory was the severe infestation by several defoliating insect species in the early 1980s. The most obvious insect was the gypsy moth, introduced from Eurasia into the US in 1869 in Medford, Massachusetts.

The gypsy moth defoliation was preceded by several years of activity by a less well-known insect complex known as the oak leaf tier/roller complex. These species are native to southern New England and until that event, little was known about them since they have not been known to occur in numbers great enough to do serious damage. The defoliation continued for several growing seasons with the most serious effects on south and west slopes, where oaks (their preferred food) predominate and trees are generally under more environmental stress. Although defoliation occurred nearly forty years ago, mortality continues in these stands as the weakened trees fall victim to secondary pathogens such as shoestring root rot (*Armillaria mellea*). Such events cause shifts in the composition of plant communities. Generally speaking, preferred hosts such as the oaks and birches suffer disproportionately and are replaced or are reduced in numbers in relation to those species that are not as susceptible such as the maples. Some scientists feel that, over the last 150 years, some of the gypsy moth's natural enemies may have established themselves, either naturally or through deliberate introduction. This appears to have reduced the severity of major outbreaks compared to that of early years.

The expansion of exotic pests, pathogens and plants as a result of rising temperatures will likely impact forest biodiversity, ecological function and resilience. Insects such as the hemlock woolly adelgid, emerald ash borer and southern pine beetle are poised to become more widespread as temperatures increase, threatening to devastate tree stands across the Northeast.

Human activities, such as clearing for agriculture in the immediate, post-European settlement era and the abandonment of these farms in the mid-nineteenth century, produced "old field" white pine stands that covered much of southern New England in the early part of the twentieth century. In the aftermath of harvesting these forests for box boards (corrugated cardboard was yet to be invented), rampant wildfires often burned up to 100,000 acres annually in the Commonwealth. An indifferent public allowed these fires to reach great size. Inadequacy of fire-suppression techniques was another factor. This period of large uncontrolled fires came to a close when the first State fire suppression forces were created in 1913. Today, public awareness of the adverse effects of wildfires has greatly reduced their frequency. The Mount Grace Fire Tower in Northfield is in active use during brush fire season and has been important for sighting fires nearby and in New Hampshire and Vermont. Aerial sightings or early detection from the Mount Grace Fire Tower have helped the Northfield Fire Department, and other communities' departments through the mutual aid program and the State's Bureau of Forest Fire Control, to quickly bring fires under control. According to the Massachusetts Fire Incident Reporting System, one brush fire was reported in Northfield between 2004 and 2010, the lowest number reported for Franklin County towns during this period. However, yearly call logs on the Northfield Fire Department website show reports from 2004-2009 for both permitted and illegal burns getting out of control multiple times each year[20].

[20] Northfield Fire Department, http://northfieldmafire.org/

Another major cause of forest fires were railroads whose locomotives spewed sparks along their rights of way. Since no trailer trucks existed in those days, almost all the products of the nation's burgeoning industrial economy moved to domestic and international markets by rail. Laws were also enacted that required spark arrestors on locomotives and the railroads were held financially liable for damages and the costs of fire-extinguishing services. On June 13, 2017, a fire engulfed about 1,500 railroad ties at the Mitchell gravel pit on Route 142 in Northfield causing an adjacent brushfire. Eleven fire departments from Franklin and Hampshire County and neighboring towns in Vermont and New Hampshire were called to the scene.[21]

Agricultural Land

In 2016, there were 2,143.82 acres of agricultural land in Northfield, which includes cropland, pastureland, orchards and nurseries and comprised 9.48 percent of the town's total land area. Northfield's agricultural land is located primarily along the Connecticut River, and along the Route 63 corridor in the eastern section of town. There are currently no dairy farms in operation in the Town of Northfield.

In 2010 the Northfield Agricultural Commission produced a map and inventory of all farms and farm stands in Northfield ranging from one-acre operations to farms of several hundred acres. The farms include cropland, tree farms, vegetables, and animals such as sheep, goats, and beef. There are 26 farms and farm stands that sell directly to the public. In addition, there are 70 farms that do not sell directly to the public.

Unusual Natural Communities

The Town's forests are diverse, including unusual communities such as Northern hardwoods and conifers; major river and high-terrace floodplain forests; and black ash and black gum swamps. The Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife has noted the Town of Northfield as having a number of uncommon ecologically significant natural communities within its borders, which support a number of the state-listed rare and endangered species. These communities include:

Northern Hardwood – Hemlock – White Pine Forest

According to the NHESP, Northfield has an excellent example of a Northern Hardwoods – Hemlock – White Pine Forest located approximately in the area of the Northfield Mountain and stretching into the Town of Erving. This forest type can be found in dry to moist, moderately acidic soils on north facing slopes and ravines. The community type can range from hemlock (*Tsuga canadensis*) in pure stands to a deciduous forest with scattered hemlocks. Other species found in this forest type include various combinations of hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*) and white pine (*Pinus strobus*). Also, there can be scattered paper birch (*Betula papyrifera*), aspen (*Populus tremuloides*), red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*). The shrub layer, which is usually open, often contains hobblebush (*Vibernum lantanoides*), red-berried elderberry (*Sambucus racemosa* ssp. *pubens*), fly honeysuckle (*Lonicera*

[21] *The Recorder*, June 13, 2017.

canadensis), and striped maple (*Acer pennsylvanicum).* The herbaceous layer is sparse but may contain intermediate woodfern (*Dryopteris intermedia*), Christmas fern (*Polystichum acrostichoides*), clubmosses (*Lycopodium* ssp.), Canada mayflower (*Maianthemum canadense*), white wood aster (*Aster divaricatus*), and wild sarsparillla (*Aralia nudicaulis*). Rand's goldenrod (*Soldago glutinosa* ssp. *Randi*) is an endangered plant species and the water shrew (*Solex palustris*) is an animal species of special concern that can be found within this forest type.

Major-River Floodplain Forest

Major-River Floodplain forests occur along large rivers such as the Connecticut River. In Northfield, major-river floodplain forests can be found in two areas, on Kidd Island and in the area of the boat ramp along the Connecticut River near Pauchaug Brook in northern Northfield. The soils found within this environment are predominantly sandy loams without a surface organic layer. Flooding occurs annually and is usually severe. The "island variant" occurs on elevated sections of riverine islands and riverbanks where there are high levels of disturbance from intense flooding and ice scour. The dominant species of this floodplain forest is the silver maple (*Acer saccharinum*), covering the majority of the overstory with lesser amounts of cottonwood (*Populus deltoides*). American elm (*Ulmus americana*) and/or slippery elm (*Ulmus rubra*) can be found in the subcanopy. Shrubs are lacking and the herbaceous layer primarily consists of stinging nettles (*Laportea canadensis*). Ostrich fern (*Matteuccia struthiopteris*) also occurs and whitegrass (*Leersia virginica*) is found in small amounts. The "island variant" has similar species, but cottonwood, sycamore (*Platanus occidentalis*) and American ash (*Fraxinus americana*) are also present in the canopy. Box elder (*Acer negundo*), staghorn sumac (*Rhus typhina*), bittersweet (*Celastrus orbiculata*), riverbank grape (*Vitis riparia*) and Virginia creeper (*Parthenocissus quinquefolia*) are also present. Floodplain forests are insect-rich habitats that attract many species of songbirds. Raptors such as bald eagles and red-shouldered hawks also use riverbank trees as perch sites. Wood ducks and hooded mergansers are found along the shady edges of the riverbanks as are Eastern comma butterflies and several species of dragonflies. Floodplain forests also provide sheltered riverside corridors for deer and migratory songbirds. Many state protected rare animal species use the floodplain forest as an important component of their habitat.

High-Terrace Floodplain Forest

The high-terrace floodplain forests can also be found in Northfield at the downstream end of Kidd Island. Typically, they occur on raised banks adjacent to rivers and streams, on steep banks along high gradient rivers particularly in western Massachusetts, on high alluvial terraces and on raised areas within major-river and small-river floodplain forests. The high-terrace floodplain forest is not subjected to annual spring flooding as it is above the flood zone.

The high-terrace floodplain forest in Massachusetts has a mixture of hardwoods generally associated with floodplains. These include red and silver maple (*Acer rubrum* and *saccharinum*) as well as sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), and basswood (*Tilia americana*). Ironwood (*Carpinus caroliniana*) is present in the sub-canopy and is a good indicator of this community. Within the shrub layer one can find arrowwood (*Viburnum dentatum*), nannyberry (*Viburnum lentago*) and winterberry (*Ilex verticillata*). The herbaceous layer is a mixture of forest ferns and upland herbs characteristic of floodplain forests. Rare plants associated with high-terrace

floodplain forest include the black maple (*Acer nigrum*), narrow-leaved spring beauty (*Claytonia virginica*), and barren strawberry (*Waldsteinia fragarioides*). Rare animal species include the Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*Abstoma laterale*), spotted turtle (*Clemmys guttata*), the wood turtle (*Clemmys insculpta*), Blanding's turtle (*Emydoidea blandingii*), and the four-toed salamander (*Hemidactylium scutatum*).

Black Gum Swamps

The Black Gum Swamp is a community type not usually found in Massachusetts. In Northfield, there are two examples in the eastern side of the town. Black gum swamps are deciduous swamp forests characterized by black gum (*Nyssa sylvatica*), but red maple (*Acer rubrum*) can also occur. These swamps are found in saddles or depressions near the tops of hills and are surrounded by upland forests. Two black gum swamps are located adjacent to the Monadnock~Metacomet Trail (officially, the New England National Scenic Trail) between Crag Mountain and Gulf Road. The soils are accumulations of muck or peat. Black gum swamps are characterized by hummocks and hollows that are seasonally flooded. These swamps occur below 1,000 feet in elevation, have relatively small watersheds, limited drainage, and are usually isolated from perennial streams. White pine, hemlock, black ash (*Fraxinus nigra*) and red spruce (*Picea rubens*) can also be found in the canopy. The subcanopy includes a mixture of the canopy species as well as yellow birch. Shrubs generally characteristic of black gum swamps are winterberry (*Ilez verticillata or I. Laevigata*) and highbush blueberry (*Vaccinium corymbosum*). Cinnamon fern (*Osmunda cinnamonea*) is the most abundant species in the herbaceous layer. Black gum swamps are similar to vernal pools in that they provide important habitat diversity for wildlife, including amphibian breeding sites.

Black Ash Swamps

Also uncommon in Massachusetts are black ash swamps, deciduous swamp forests consisting of a high diversity of tree species including black ash (*Fraxinus nigra*) and red maple (*Acer rubrum*). Found in a wide variety of settings, black ash swamps usually occur with significant groundwater seepage. They can be found in depressions at or near the headwaters of streams and occasionally on sloping edges of river floodplains or as within areas of red maple swamps. An area of black ash swamp can be found in the northwestern Northfield.

Besides black ash (*Fraxinus nigra*), red maple (*Acer rubrum*) can also be found in the canopy of black ash swamps. White pine, hemlock and yellow birch may also be present. The subcanopy includes American elm (*Ulmus americana*). The shrub layer is quite diverse, but the most characteristic shrub is winterberry (*Ilex verticillata*). The herbaceous layer is also diverse with cinnamon fern and skunk cabbage (*Symplocarpus foetidus*) the most abundant. The high coverage of ferns in the black ash swamp is one of its more striking characteristics. Besides the cinnamon fern, royal fern (*Osmunda regalis* var. *spectabilis*), marsh fern (*Thelypteris palustris*), and sensitive fern (*Onoclea sensibilis*) can be found.

Level Bogs

Level bogs are wetland communities with accumulations of incompletely decomposed organic material (peat) that develop along ponds, at the headwater of streams, or in isolated valleys without

inlet or outlet streams. With no streamflow and isolation from the water table, level bogs are the most acidic and nutrient poor of peatland communities. Examples of level bogs are limited in Massachusetts and as such, have been designated Priority Natural Communities for Protection. In Northfield, a portion of a level bog is associated with Steven's Swamp, which can be found in the eastern section of Town in Northfield State Forest along the town's border with Warwick.

A level bog consists of a mixture of tall and short ericaceous shrubs, which dominate the landscape. Leatherleaf (*Chamaedaphne calyculata*) is dominant, but other ericaceous shrubs such as rhodora (*Rhododendron canadense*), sheep laurel (*Kalmia angustifolia*), bog laurel (*Kalmia polifolia*), bog rosemary (*Andromeda polifolia* var. *glaucophylla*), Labrador tea (*Ledum groelandicum*), and low-growing large and small cranberry (*Vaccinium macrocarpon* and *V. oxycoccus*). Stunted coniferous trees, mainly tamarack (*Larix laricina*) and black spruce (*Picea mariana*), occur throughout the level bog. A mixture of bog plants also grow on the Sphagnum surface and include carnivorous pitcher plants (*Sarracenia purpurea*), and sundews (*Drosera rotundifolia* and *D. intermedia*).

Four rare plant species occur in level bogs: pod-grass (*Scheuchzeria palustris*), dwarf mistletoe (*Arceuthobium pusillum*), mud sedge (*Carex limosa*) and northern yellow-eyed grass (*Xyris montana*). Pod-grass and dwarf mistletoe are protected under the Massachusetts Endangered Species Act. Several rare animal species also occur in level bogs. Of these, three species are considered endangered: the spatterdock darner (*Aeshna mutata*), ebony boghaunter (*Williamsonia fletcheri*), and ringed boghaunter (*Williamsonia lintneri*).

Public Shade Trees

Northfield is fortunate to have many roads that are bordered by shade trees, which promote both environmental quality, and quality of life for residents. Street trees in more heavily developed areas also provide a pleasant environment for pedestrians to walk, thereby encouraging recreation and visitors and shoppers to spend time in a downtown.

Before the hurricane of 1938 Northfield's historic Main Street was famous for the many graceful elm trees that lined the street. These elm trees were so large that they seemed to meet high over the center of the street. But the hurricane left a barren, dusty landscape with the elms flattened across the street. In 1815 a young lawyer had planted these hundreds of elm tree seedlings along the street. In several decades, the elms grew to grace the dusty street, providing shade and a green visual frame to the colonial homes. Since then, the few remaining elms, similar to all the elms in northeast, died from Dutch Elm Disease.

In 2005, the engineering firm Dufresne-Henry along with the Massachusetts Highway Department developed plans for sidewalk reconstruction and a 'streetscape' in the Main Street area. Dufresne Henry in association with Warren Spinner of Shade Tree Associates from Essex Junction, VT., inventoried all the trees in the project area. Of the 220 trees in the inventory, the report recommended that thirty seven be removed immediately. Other suggested maintenance included crown cleaning, cabling, fertilizing, and young tree training, and a suggested maintenance schedule for the next few years. The Main Street Revitalization Project also included sidewalk reconstruction and parking plans.

Because this early engineering had been completed, the streetscape project was eligible for funds from the American Recovery and Revitalization program, and in 2008 work began to replace the sidewalks, remove the trees, and plant new trees and shrubs. The new, wide sidewalks on both sides of the street make walking a pleasure. In some places the sidewalks curve around large trees that did not need to be removed. The new trees - maples, oak, pear, ash, ginko, etc – are flourishing. The cherry trees, planted years before the project, provide masses of pink blossoms each spring. And the variety of trees means that an insect or virus, such as the Dutch Elm Disease, will not decimate the entire planting.

The benefits of street trees include the following:[22]

- Air quality improvement Water quality improvement (incl. improved stormwater management)
- Cooler air temperatures
- Greenhouse gas reduction
- Building energy conservation
- Noise reduction
- Wildlife habitat
- Social/psychological benefits
- Human health benefits
- Aesthetics

In 2018, the Franklin Regional Council of Governments produced the *Town of Northfield Tree Planting and Maintenance Plan* for Northfield's downtown based on findings from a 2017 Tree Inventory. The inventory analyzed baseline conditions of the health of existing municipal trees, assessed the need for additional trees, and created a management plan for needed maintenance or removal. The study furnished detailed recommendations for new trees planting locations and species selections on Main Street and additional streets downtown, including Highland Avenue and East Street. The plan also provides a Summary Action Plan to support implementation of goals.

The Franklin Regional Council of Governments has also compiled a list of Climate Resilient Trees for Streetside Tree Belt Planting, including both shade and ornamental trees. The list provides information on the characteristics of 28 species of trees, including height and spread of the mature tree, whether it is native to North America, the USDA grow zone, light and watering requirements. In addition, the list indicates whether each species is tolerant to drought, salt, air pollution and clay soils; whether it has showy fall foliage or flowers; and whether it is appropriate to plant under utility lines. (See Appendix for the *Town of Northfield Tree Planting and Maintenance Plan* and list of *Climate Resilient Trees for Streetside Tree Belt Planting.)*

[22] Rick W. Harper, Ext. Assist. Professor-Urban and Community Forestry, UMass, "Realizing the Benefits of our Urban Trees," *3rd Annual Massachusetts Clean Energy Conference: Helping Communities with Renewables and Efficiency;* 2016.

Rare, Threatened and Endangered Plant Species

Rare and endangered plants listed by the Division of Fisheries and Wildlife as being located in Northfield include:

Table 4-2: Plant Species in Northfield Listed as Special Concern, Threatened, or Endangered

Scientific Name	Common Name	MESA Status*	Most Recent Observation
Boechera missouriensis	Green Rock-cress	T	2015
Carex grayi	Gray's Sedge	T	2013
Cerastium nutans	Nodding Chickweed	E	2016
Elatine Americana	American Waterwort	E	2012
Eleocharis diandra	Wright's Spike-rush	E	2016
Eleocharis intermedia	Intermediate Spike-sedge	T	2014
Eleocharis ovata	Ovate Spike-sedge	E	2015
Eragrostis frankii	Frank's Lovegrass	SC	2016
Ludwigia polycarpa	Many-fruited False-loosestrife	E	2012
Mimulus alatus	Winged Monkey-flower	E	2012
Ophioglossum pusillum	Adder's-tongue Fern	T	1961
Panicum philadelphicum ssp. philadelphicum	Philadelphia Panic-grass	SC	2016
Sagittaria cuneate	Wapato	T	2016
Symphyotrichum prenanthoides	Crooked-stem Aster	SC	2012

*SC – Special Concern; T - Threatened; E – Endangered.
Source: Massachusetts NHESP, Town Species Viewer: http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html. Accessed, August, 8, 2019.

NHESP has identified 256 native plant species as rare in the Commonwealth, and fifteen of these rare plants have been documented in the Town of Northfield (*see Table 4-2*). These plants occur in some of the Core Habitats identified in the next section. Plants (and animals) listed as *endangered* are at risk of extinction (total disappearance) or extirpation (disappearance of a distinct interbreeding population in a particular area). *Threatened* species are likely to become endangered in the foreseeable future. Species of special concern have been documented to have suffered a decline that could result in its becoming threatened, or occur in very small numbers and/or have very specialized habitat, the loss of which could result in their becoming threatened (NHESP and The Nature Conservancy, *Our Irreplaceable Heritage: Protecting Biodiversity in Massachusetts*; 1998). Plants on the unofficial Watch List are not regulated.

F. FISHERIES AND WILDLIFE

Northfield's forests, rivers, wetlands and open farmland provide habitat for a variety of common and rare wildlife species. This section discusses wildlife species and their habitats from the perspective of natural communities, individual species, and potential patterns of wildlife distribution and movement across the landscape.

Before the Northeast was colonized, native people cleared large areas and burned them annually to maintain tillable fields. When colonists subsequently occupied the region they cleared more land, expanding the open countryside. Much of southern New England at one time was nearly denuded of forests. It is thought that approximately three-quarters of western Massachusetts was deforested before 1800. By 1850 many fields were abandoned when farmers left to re-establish themselves in Ohio and adjacent states with more fertile and tillable soils. The fields were abandoned and the natural succession of vegetation began. Within three decades the early stages of reforestation had commenced; at the turn of the century, mature forest dominated this area. Today, forest wildlife species are now dominant, and the early successional stages and grasslands, important to many wildlife species, are less common.

General Description and Inventory of Wildlife and Wildlife Habitats

Individuals of the following species of wildlife are commonly observed in the Transition Hardwood-White Pine forest type, as is found in Northfield, as members of migrating, wintering, or breeding populations. The lists are based on information presented in New England Wildlife: Management of Forested Habitats by R.M. DeGraaf et. al., published in 1992, which correlates wildlife with the major forest type in the area. The species are listed by category (amphibians, reptiles, birds, or mammals), then by type of habitat and by size of home range. It is by no means a complete inventory of all species that may be found in Northfield.

Amphibians

These species are found in forest, wetland, and open upland habitats and require a home range 1-10 acres in size:

Red-spotted Newt, Four-toed Salamander, Jefferson Salamander, Eastern American Toad, Northern Spring Peeper, Bullfrog, Green Frog, Wood Frog, Northern Dusky Salamander, Northern Spring Salamander, Northern Two-lined Salamander, Redback Salamander, Gray Tree Frog, and Pickerel Frog

This species is found in forest habitats and requires a home range 11-50 acres in size:

Spotted Salamander

Reptiles

These species are found in forest, wetland, and open upland habitats and require a home range 1-10 acres in size:

Wood Turtle, Spotted Turtle, Eastern Painted Turtle, Eastern Box Turtle, Eastern Garter Snake, Eastern Hognose Snake, Bog Turtle, Map Turtle, Ring-necked Snake

This species is found in forest, wetland, and open upland habitats and requires a home range 11-50 acres in size:

Common Snapping Turtle

These species are found in forest, wetland, and open upland habitats and requires a home range >50 acres in size:

Black Rat Snake, Eastern Milk Snake

Birds

These species are found in forest /nonforested habitats and require a home range 1-10 acres in size:

Common Goldeneye, Hooded Merganser, Red Breasted Merganser, Ruby-throated Hummingbird, Yellow-bellied Sapsucker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Eastern Wood-Pewee, Yellow-bellied Flycatcher, Alder Flycatcher, Willow Flycatcher, Least Flycatcher, Eastern Phoebe, Black-capped Chickadee, Tufted Titmouse, House Wren, Carolina Wren, Winter Wren, Golden Crowned Kinglet, Ruby Crowned Kinglet, Blue-gray Gnatcatcher, Eastern Bluebird, Bobolink, Veery, Hermit Thrush, Wood Thrush, American Robin, Brown Thrasher, Cedar Waxwing, Solitary Vireo, Yellow-throated Vireo, Warbling Vireo, Philadelphia Vireo, Red-eyed Vireo, Blue-winged Warbler, Tennessee Warbler, Nashville Warbler, Northern Parula, Yellow Warbler, Chestnut-sided Warbler, Black-throated Blue Warbler, Yellow-rumped Warbler, Black-throated Green Warbler, Blackburnian Warbler, Lawrence's Warbler, Prairie Warbler, Blackpoll Warbler, Black-and-White Warbler, American Redstart, Ovenbird, Northern Waterthrush, Song Sparrow, White-crowned Sparrow, Lincoln Sparrow, White-throated Sparrow, Dark-eyed Junco, Common Grackle, Brown-headed Cowbird, Northern Oriole, Rufous-sided Towhee, Purple Finch, House Finch, Scarlet Tanager, Northern Cardinal, Rose-breasted Grosbeak, Indigo Bunting, Great Crested Flycatcher, Tree Swallow, Blue Jay, Mourning Warbler, Common Yellowthroat, Wilson's Warbler, Canada Warbler, Chipping Sparrow, Fox Sparrow, Field Sparrow, Grasshopper Sparrow, Henslow's Sparrow, American Goldfinch, Gray Catbird, Great Blue Heron, Green-backed Heron, Wood Duck, American Black Duck, Green-winged Teal, Mallard, Northern Pintail, Blue-winged Teal, American Wigeon, Ring-necked Duck, Evening Grosbeak, American Redstart, Red Crossbill, White-winged Crossbill, European Starling, Sora, Killdeer, Spotted Sandpiper, Common Snipe, Northern Mockingbird, Pied-billed Grebe, American Bittern, Mourning Dove, Pine Siskin, Louisiana Waterthrush, Virginia Rail, Eastern Kingbird

These species are found in forest/nonforested habitats and require a home range 11-50 acres in size:

Ring-necked Pheasant, Ruffed Grouse, Upland Sandpiper, Black-billed Cuckoo, Yellow-billed Cuckoo, Common Nighthawk, Whip-poor-will, Northern Rough-winged Swallow, Bank Swallow, Barn Swallow, Red-breasted Nuthatch, White-breasted Nuthatch, Brown Creeper, Swainson's Thrush, American Woodcock, Pine Grosbeak, Horned Lark

These species are found in forest/nonforested habitats and require a home range >50 acres in size:

Turkey Vulture, Bald Eagle, Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawk, Red-shouldered Hawk, Broad-winged Hawk, Red-tailed Hawk, American Kestral, Peregrine Falcon, Wild Turkey, Great Horned Owl, Barred Owl, Northern Saw-whet Owl,

Pileated Woodpecker, American Crow, Common Raven, Chimney Swift, Belted Kingfisher, Northern Harrier

These species are found in forest/nonforested habitats with unknown home ranges:

American Tree Sparrow, Bohemian Waxwing, Northern Shrike, Common Redpoll, Red Bellied Woodpecker, Olive-back Flycatcher, Savannah Sparrow, Cattle Egret, Snowy Egret, Snow Bunting, American Pipit

Mammals

These species are found in forest habitats and require a home range 1-10 acres in size:

Eastern Cottontail, Snowshoe Hare, Eastern Chipmunk, Gray Squirrel, Red Squirrel, Beaver, Deer Mouse, White-footed Mouse, Meadow Vole, Star-nosed mole, Pygmy Shrew, Least Shrew, Eastern Mole, Muskrat

These species are found in forest habitats and require a home range 11-50 acres in size:

Virginia Opossum, Porcupine, Ermine, Long-tailed Weasel

These species are found in forest habitats and require a home range >50 acres in size:

Woodchuck, Coyote, Red Fox, Grey Fox, Black Bear, Raccoon, Fisher, Mink, Striped Skunk, River Otter, Bobcat, White-tailed Deer, Moose

These species are found in forest/nonforested habitats with unknown home ranges:

Little Brown Myotis, Silver Haired Bat, Eastern Pipistrelle, Big Brown Bat

Core Habitats and Rare, Threatened or Endangered Species

The BioMap2 Project has identified areas throughout the state that are critical to supporting the maximum number of terrestrial and wetland plant and animal species, and natural communities. It uses Estimated Habitats and other documentation to identify the areas most in need of protection in order to protect the native biodiversity of the Commonwealth. BioMap2 focuses primarily on state-listed rare species and exemplary natural communities and was developed to promote strategic land protection of those areas that would provide suitable habitat over the long term. BioMap2 shows those areas designated as Core Habitats and Critical Natural Landscapes. The Core Habitat areas, identified through field surveys, include the most viable habitat for rare plants and rare animals and exemplary natural communities. The Critical Natural Landscapes, determined through analyses using Geographic Information Systems (GIS) mapping programs, include buffer areas around the Core Habitats, large undeveloped patches of vegetation, large "roadless" areas, and undeveloped watersheds. *(See* Scenic Resources & Unique Environments *map at the end of this section.)*

The National Heritage and Endangered Species Program (NHESP) recognized three types of Core habitats in Northfield: Aquatic, Wetland, and Forest Cores. Aquatic Cores are intact river corridors within which important physical and ecological processes of the river or stream occur. They delineate integrated and functional ecosystems for fish species and other aquatic Species of Conservation Concern. Wetlands Cores are the least disturbed wetlands in the state within undeveloped landscapes - those with intact buffers and little fragmentation or other stressors

associated with development. These wetlands are most likely to support critical wetland functions (i.e., natural hydrologic conditions, diverse plant and animal habitats, etc.) and are most likely to maintain these functions into the future. Forest Cores include the best examples of large, intact forests that are least impacted by roads and development, providing critical habitat for numerous woodland species. Forest Cores supports many bird species sensitive to the impacts of roads and development, such as the Black-throated Green Warbler, and helps maintain ecological processes found only in unfragmented forest patches.[23]

Core Habitat areas in Northfield:

- An area in the northwestern most corner of town, including a small portion of Northfield State Forest (*Protected from development*);
- An area containing Hell's Kitchen, Lily Pond, and Sawyer Ponds and stretching west to the town's border with Bernardston (*Not protected from development*);
- An area at the southwestern end of Bennett Meadow (*Not protected from development*);
- Along the Connecticut River from Little Meadow to the town's border with Erving (*About half is protected from development*);
- The area of the confluence of Pauchaug Brook and the Connecticut River (*Protected from development*);
- Along the first 1.5 miles of Millers Brook as well as its tributaries (*Not protected from development*);
- An area east of Coller Cemetery, surrounding an unnamed intermittent stream which drains into Moss Brook in Warwick and connects to a larger Core Habitat area also in that town (*Not protected from development*);
- An area located in the southeastern most corner of town that continues into the Town of Erving and includes Northfield Mountain (*Not protected from development*),
- Along the banks of Four Mile Brook, including tributaries,
- Along the banks of Jacks Brook from its headwaters to its confluence with the Millers River,
- Along the banks of Keyup Brook from its headwaters in Northfield State Forest, including tributaries, to its confluence with the Millers River,
- Along the banks of Louisiana Brook from within a mile from its headwaters at Grandin Reservoir, to its confluence with the Connecticut River, and
- Along the banks of Mill Brook from its headwaters in Northfield State Forest, to its confluence with the Connecticut River.

The Millers Rivers and Roaring Brooks and some tributaries are part of the extensive Connecticut River Core Habitat. Wood Turtles and two rare dragonflies are found in and near the Forest Core. The Millers and Tully Rivers and associated uplands support 12 rare and uncommon species, including two freshwater mussels and five dragonflies.

[23] http://maps.massgis.state.ma.us/dfg/biomap/pdf/town_core/Northfield.pdf

Of the many large areas of contiguous forest in Northfield, there are several considered by the NHESP to contain Critical Natural Landscapes that buffer or link lands to the Core Habitat areas (See *Scenic Resources & Unique Environments* map at the end of this section):

- The eastern forest block, the largest Critical Natural Landscape in Northfield, contains forests along the town's entire border with Warwick west to Louisiana Mountain, Strowbridge Hill, Garnet Rock, Birnam Road, Northfield Reservoir, Round Hill, Gulf Road, Orange Road and Keyup Brook. Two of the largest parcels of Northfield State Forest lie within this forest block.
- The northwestern block of Critical Natural Landscape from the town's border with Vermont south to Little Meadow and west to the Town of Bernardston. This block contains two Northfield State Forest parcels and a portion of Satan's Kingdom.
- The southern block beginning near Beers Mountain and Roman Hill, including South Mountain, and Four Mile Brook and its tributaries. This Critical Natural Landscape stretches into the Town of Erving and includes a Core Habitat located in the southeastern most corner of town that continues into the Town of Erving and includes Northfield Mountain.
- A Critical Natural Landscape along the Connecticut River from the town's border with Vermont and New Hampshire south to the Schell Bridge.

Large blocks of contiguous forestland such as these are important regional resources for several reasons. First, they represent an area with a low degree of fragmentation. Wildlife species that require a certain amount of deep forest cover separate from people's daily activities tend to migrate out of fragmenting landscapes. New frontage lots and subdivisions can often result in a widening of human activity, an increase in the populations of plants and animals that thrive alongside humans (i.e. raccoons and squirrels) and a reduction in the species that have larger home ranges and unique habitat needs. When these large blocks of forest are protected from development they help to protect and provide clean water, air, and healthy wildlife populations. In addition, areas of unfragmented forest are more suitable for active forest management.

The Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife has designated several "Priority Habitat" areas in the Town of Northfield. A Priority Habitat is an area where plant and animal populations protected by the Massachusetts Endangered Species Act Regulations (321 CMR 10.00) may occur. These areas include:

- Along the banks of the Connecticut River up to approximately one quarter mile inland;
- Along the banks of Millers Brook from its headwaters to approximately the intersection of Alexander Hill Road and Gulf Road, including tributaries along Alexander Hill Road and Gulf Road;
- Pine Meadow Brook from its confluence with the Connecticut River to approximately one half mile upstream; and
- Along the banks of the Sawyer Ponds.

The Priority, Core, and Critical Natural Landscape habitats documented in Northfield are home to many species of conservation concern recognized by the Massachusetts Endangered Species

Act (MESA). The State also produced a State Wildlife Action Plan (SWAP), which presents the 570 species of greatest conservation need in the Commonwealth, the 24 types of habitat that support these species, and the actions necessary to conserve them.[24] SWAP identifies other wildlife species that are of significant regional conservation concern but do not meet the requirements for inclusion in the regulatory framework of the Massachusetts Endangered Species Act. Of the non-listed Species of Conservation Concern highlighted in SWAP, 27 species are directly mapped for inclusion in BioMap2.[25] Table 4-3 shows state-listed Insect, Reptile, Fish, Mussel, Bird and Amphibian species known to occur in Northfield in 2019.

Table 4-3: Insect, Reptile, Fish, Mussel, Bird and Amphibian Species in Northfield Listed as Special Concern, Threatened, or Endangered

Scientific Name	Common Name	MESA Status*	Most Recent Observation
Alasmidonta heterodon	Dwarf Wedgemussel	E	1948
Ambystoma jeffersonianum	Jefferson Salamander	SC	2016
Botaurus lentiginosus	American Bittern	E	2007
Cicindela purpurea	Cow Path Tiger Beetle	SC	1898
Circus cyaneus	Northern Harrier	T	1932
Glyptemys insculpta	Wood Turtle	SC	2014
Gomphus abbreviatus	Spine-crowned Clubtail	SC	2008
Gomphus vastus	Cobra Clubtail	SC	2014
Gomphus ventricosus	Skillet Clubtail	T	2008
Haliaeetus leucocephalus	Bald Eagle	T	2018
Hybognathus regius	Eastern Silvery Minnow	SC	1980
Lampsilis cariosa	Yellow Lampmussel	E	1935
Neurocordulia yamaskanensis	Stygian Shadowdragon	SC	2008
Strophitus undulatus	Creeper	SC	1997
Stylurus amnicola	Riverine Clubtail	E	2008

*SC – Special Concern; T - Threatened; E – Endangered.
Source: Massachusetts NHESP, Town Species Viewer: http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/species-information-and-conservation/town-species-viewer.html. Accessed, August, 8, 2019.

Wildlife Migration, Landscape Change, and Conserving Biodiversity

Northfield is located within several regional belts of protected open space that contribute to the value of the already protected land in town. The Quabbin Reservoir Reservation is a particularly important source of wildlife for surrounding communities. The Quabbin Reservoir covers 39 square miles just southeast of Northfield. The town is also surrounded by of a chain of several state forests that create another belt of protected open space. Warwick State Forest, Wendell State Forest, Erving State Forest, the Montague Wildlife Management Area, Northfield State Forests, and the Mt. Grace State Forest represent large contiguous areas of protected lands that provide important corridors for wildlife migration, which will become increasingly critical as the

[24] https://www.mass.gov/service-details/state-wildlife-action-plan-swap, accessed January 15, 2020
[25] https://www.mass.gov/files/documents/2016/08/np/speciesofcc.pdf, accessed January 15, 2020

effects of climate change continue to take place. Ensuring that there are no gaps to these corridors in Northfield can help bolster the resiliency of wildlife in the region and the state.

The existence and abundance of wildlife species are dependent on habitat; as habitats change through natural succession, by human activities, or the effects of climate change, local animal populations fluctuate. In general, each stage of succession (the series of ecological communities that occur in a given area as species structure and natural community processes change with time) supports a particular array of wildlife. As mentioned in the beginning of this section, climate change is expected to alter species distributions. As species move to adjust to changing conditions, federal, state and local agencies and entities involved in land conservation need a way to prioritize strategic land conservation that will conserve the maximum amount of biological diversity despite shifting species distribution patterns. The *BioMap2* project and The Nature Conservancy's resiliency mapping are two resources that can be consulted when working to prioritize conservation for species diversity and health. NHESP Priority Habitats for Rare and Endangered Species are shown on the Scenic Resources & Unique Environments map at the end of this section.

There are two concepts that can be used to help explain Northfield's options for pursuing the conservation of the town's biodiversity: Island Biogeography and landscape ecology. The theory of Island Biogeography is based on observations that biodiversity is greater on large islands than on small ones, and greater on islands that are close to the mainland. The concept of islands surrounded by water has been applied to the idea of "islands" of protected open space surrounded by developed areas. Based on this theory, ecologists predict that increasing the size of a protected area increases its biodiversity (MacArthur and Wilson; 1967). Therefore, connecting two protected areas via a protected corridor to create one large area should also increase natural biodiversity (Wilson and Willis; 1975).

Another model for wildlife habitat protection aggregates similar land uses while allowing other uses in discrete areas (Forman; 1997). This model is reflected in Northfield's current land use patterns. In the northwest and in the east, are large areas of mostly contiguous forest that may be best managed as wildlife habitat, forest products, and water supply recharge areas. Housing is located at the edges of these forest areas though roads bisect them in areas. The best farmland in town is aggregated along the floodplains of the Connecticut River while most of the population is centered either in the villages or along roadway corridors.

Individual animals move within a landscape. When and where wildlife and fish species move is not well understood by wildlife biologists, and their movement does not follow political boundaries. Wildlife seek natural cover for shelter and food, but some species willingly forage where human uses, such as farm fields, gardens and even trash cans, provide browse or food. As the land within Northfield continues to be fragmented by development, it is reasonable to expect that remaining large blocks of undeveloped forest and the parcels of land connecting them will become more important to area wildlife and conflicts between the needs of wildlife and residents will become more common.

In 2011, the Landscape Ecology Program at university of Massachusetts Amherst completed a comprehensive assessment of ecological integrity using a computer software program called

Conservation Assessment and Prioritization System (CAPS). The results show large blocks of unfragmented habitat similar to those identified by the Natural Heritage and Endangered Species as crucial for supporting critical habitat.

Many species of wildlife in Northfield have home ranges greater than fifty acres in size. Even those species with smaller home ranges move across the landscape between sources of shelter, water, food and mating areas. Some animals, including white-tailed deer and black bear, seek both interior forest habitat and wetland edges where food sources may be more abundant.

Roads are a form of connection for humans but they can be an impediment to some wildlife movement. Wildlife benefit from having land to move within that is isolated from human uses. Conservation planning that recognizes this need often focuses on the development of wildlife corridors. Permanently protected wildlife corridors are particularly critical in a landscape which is experiencing development pressures to ensure that animals have the ability to travel across vegetated areas between large blocks of habitat.

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

How will the Town of Northfield determine the most appropriate conservation strategies for wildlife habitat? There are three general paths to follow in conserving the health of wildlife populations. One is to protect the habitat of specific species that are rare, threatened, or endangered. It is thought that other species will also benefit from this strategy. A second path is to conserve landscape-level resources such as contiguous forest or riparian areas. This helps to protect the habitats of a large number of species, but it might not meet the needs of all rare and endangered species. The third method is a combination of the first two. Maintaining the biodiversity of Northfield over the long term will likely require the protection of both unique habitats for specific species and networks of habitat across the landscape. Conservation strategies for the Town to consider include monitoring of species locations, numbers, and movements; the protection of core habitat areas as identified by the NHESP BioMap2 (*see* Scenic Resources & Unique Environments *map at the end of this Section*); the continued protection and linkage of large blocks of contiguous forestland; the retention of early successional habitats like fields and grasslands; and the protection of vernal pools, wetlands, and riparian corridors that sustain the greatest diversity of life in Northfield.

G. SCENIC RESOURCES AND UNIQUE ENVIRONMENTS

This section identifies the scenic resources and unique environments that most Northfield residents would agree represent the essence of Northfield's character. The purpose for inventorying the scenic resources and unique natural environments in Northfield is to provide the basis for prioritizing resource protection efforts. For this reason, the following section includes information about the different values associated with each scenic resource and natural

environment and identifies areas where there are multiple values represented in one landscape. Those landscapes that contain, for example, scenic, wildlife, and cultural values may be seen as having a higher priority for protection than a landscape that contains only one value.

Northfield has many special places that offer residents enjoyment and a sense of place. These areas have scenic, cultural, historic, and ecological or wildlife values, are on public or private land, and may or may not have some level of protection. The unique environments in Northfield play a very important role in providing residents with a sense of place. Brooks, mountains, wetlands, and village centers provide markers on the landscape within which people navigate day to day life.

Cultural and historical resources include sites dating from the colonial period, such as Northfield's Main Street, to the nineteenth century railroads, and saw mill and grist mills sites which helped to expand the Town's economy. For much of the 20th century, two large institutions – the Northfield School for Girls/Northfield Mount Hermon and The Northfield (Inn) were the predominant man-made features of the town, and gave the town much of its beauty.[26] Though the Northfield Inn has been demolished and the Northfield Mount Hermon School has closed its Northfield campus, several distinctive architectural features remain on the campus. More recent structures include churches, the public library, and municipal buildings. Scenic roads and trails provide access to woods, meadows, streams, and hillside views. Such resources include major and minor trails such as the New England National Scenic Trail, the Northfield State Forest trails network maintained by Northfield residents, as well as numerous old roads and logging trails. Stream corridors, wetlands, ponds, and the Connecticut River are natural areas that provide both scenic and wildlife values. Unusual natural communities and geologic features include bogs, grasslands, and meadow sanctuaries, and rocky outcrops.

Important historic resources in Northfield include:

- Main Street National Historic District (National Register of Historic Places);
- Simeon Alexander House (Millers Falls Road);
- Northfield District Schoolhouse #2 (Pine Street);
- Schell Memorial Bridge
- King Philips Hill;
- Historic buildings along Millers Falls Road and Warwick Road;
- Various buildings and landscapes on the Northfield Mount Hermon Campus;
- Rustic Ridge Houses;
- 88 Main Street: address of the first American Youth Hostel;
- Historic cemeteries;
- Ferry sites;
- Original homestead of Calvin Swan and Dwight L. Moody
- Cellar holes in; the Town Forest and in the State Forest.
- The working farms of Northfield;
- Northfield State Forest; and,
- Kidd's Island.

[26] https://www.northfieldma.gov/sites/northfieldma/files/uploads/a_master_plan_for_northfield.pdf

In 2014, Martha Lyon Landscape Architecture, LLC led a consulting team to produce *A Master Plan For Northfield*, which inventoried historic, scenic, and cultural resources and identified opportunities, issues, and recommendations for how to protect and preserve the major heritage landscapes in town, which included:

- Agriculture as a historic land-based economy;
- The five distinct villages in town, the Farms, the Mountain, Main Street, East Northfield, and West Northfield;
- Architectural treasures including houses designed and built by the Stearns family, and buildings designed by world-renowned architects on the Northfield School campus;
- Historic town buildings situated between Northfield Mountain and the Connecticut River providing an authentic 19th century appearance and visual appeal;
- The historically distinct Northfield center, featuring a small village with the houses set far back from the street and a long narrow commons.
- Natural beauty, including the river, farms, woods, open spaces, Rustic Ridge, views and vistas.

Table 4-4 includes the results from the 2007 the Trust for Public Land visioning process to identify and prioritize lands for conservation, along with additional sites identified in the 2005 and 2020 Open Space and Recreation Plans.

Northfield Sunrise *(Jerry Wagener)*

Table 4-4: Significant Recreational/Scenic/Historic/Natural Landscapes/Environments in Northfield

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
STREAM CORRIDORS			
Connecticut River	Fishing and boating.	First river in the U.S. to be designated a "National Blueway,"a model for how communities can integrate their land and water stewardship efforts with an emphasis on 'source-to-sea' watershed conservation. Class B water quality designation; Priority Habitat; Estimated Habitat	The whole valley from Pasquamstuc Falls to Wanasquatok Brook was dotted with Native villages, especially on tributaries where there were waterfalls.(See "History of Northfield" Temple and Sheldon, 1875, p.34.)
Pauchaug Brook	Fishing; Trout stocked annually	Lower portion is part of Pauchaug Brook Wildlife Management Area; Core Habitat; Critical Natural Landscape	Significant historical value site; Native American camps during French & Indian War, tribal dancing ground. (See "History of Northfield" Temple and Sheldon, 1875, p.8.)
Louisiana Brook		Public drinking water supply – Grandin Reservoir; Class A water quality; Outstanding Resource Water designation	
Mill Brook	Fishing; Trout stocked annually	Cascades	Native American encampments and salmon runs harvesting for food; later colonial mills. A Native village on site between current Mill Street and Glen Road. Upstream was the site of a town swimming hole in the 20th c..
Minot Brook		Town water supply watershed	
Millers Brook		Priority Habitat; Estimated Habitat	Called "Squenatock" or "the pouring out place" and "Quanatock" circa 1686 by Native Americans. South boundary of the land sold by Massamet, one of the sachems who owned the land and whose name is on the deed in Town Hall, to the English.
Roaring Brook	Fishing; Trout stocked annually	Sheep Falls; Salmon Falls	Site of former grist mill, pool for washing sheep before shearing, and Capt. Richard Beers' battle with Native people.
Merriam Brook			See p. 8, History of Northfield, Temple and Sheldon, 1875 for Native presence. Samuel Merriam first to build there. Location of an early "sash and blind" factory.

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
Pine Meadow Brook		Priority Habitat; Estimated Habitat	
Fisher Brook			
Four Mile Brook	Fishing; Trout stocked annually		Significantly large Native village on the banks of the waterfall (p. 8, Temple and Sheldon). Source of lithic stone used for Native tools. Shown on 1720 survey as being primarily in Northfield. Former site of sawmill upstream from "King's Highway." In 1820 Elihu Stratton built a gristmill there; two miles upstream there was a saw mill. .
Bottom Brook		Headwaters protected; black ash swamp	
Mallory Brook		Headwaters protected; dusky salamanders	
East Wait Brook		Portions of brook included in Satan's Kingdom WMA; four-toed and two-lined salamanders; headwaters protected	
West Wait Brook		Portions of brook included in Satan's Kingdom WMA	
Sawmill Brook			Located on the west side of Brush Mtn., aka "Roaring Brook"; Native name of "Nauyaug" meaning "the roaring falls': Elias Bascom operated a clothing mill and a grist mill on the brook.(See p. 8, "History of Northfield," Temple and Sheldon, 1875) "
Bennett Brook		Lower portion is part of the Bennett Meadow WMA	Original Native name was "Natanis."
Jack's Brook		Headwater stream	
Keyup Brook		Permanently protected as part of Northfield State Forest	Colonial settlement; site of old mills originally owned by Zachariah Field and Calvin Priest.
Wannamaker Brook			Fed a former swimming hole.
PONDS AND LAKES			
Sawyer Ponds	Scenic view	Priority Habitat; Estimated Habitat	Privately owned
Streeter Pond	Scenic view	Priority Habitat	
WETLAND AREAS			

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
Hell's Kitchen & Lily Pond	Hiking; birding; fishing	Permanently protected as part of Satan's Kingdom Wildlife Management Area; Biomap 2 Core	
Mill Brook Swamp and Schell Pond	Scenic view; birding	Priority Habitat; Critical Natural Landscape	Site of historic chateau
Pond and Swamp near Center Cemetery	Famous birding site		
Great Swamp & Keyup Brook	Hiking; cross country skiing	Permanently protected as part of Northfield State Forest. Core Habitat	Early settlement site
RECREATION AREAS			
Alderbrook Meadow Accessible Trail	Walking, interpretive signage describes early Native presence, flora and fauna.		Part of the water systems of the Sawmill/ Roaring Brooks. (See p. 8, "History of Northfield," Temple and Sheldon, 1875)
Northfield Mountain Recreation Area	Hiking; Cross-country skiing; Mountain biking; Horseback riding; Recreational and Environmental programs		Significant railroad arch over Ferry Street near entrance of Riverview Picnic area.
Riverview Picnic Area	Picnicking and access to the Connecticut River		
Munn's Ferry Boat Camping Area	Camping area on the Connecticut River; Accessible by boat only		Historic Ferry Landing
Kidd's Island, Connecticut River	Camping and picnicking; Accessible by boat only	Major-River Floodplain Forest; High Terrace Floodplain Forest	Historic Recreational Landscape
Brush Mt. Conservation Area	Trail head for New England National Scenic Trail Snowshoeing, cross-country skiing	Snake habitat, Condensation garden Wildlife habitat; Critical Natural Landscape	Original homestead of Calvin Swan 1799-1865, African American free man; abolitionist, sawmill owner.
Northfield Town Forest	Hiking, Cross country skiing, snowshoeing	Certified vernal pool Wildlife habitat; Critical Natural Landscape	Historic Recreational Landscape
Northfield State Forest	Hiking; fishing; seasonal hunting; cross-country skiing; snowmobiling	Level Bog located in eastern Northfield section	Historic Recreation/Conservation Landscape; Cellar holes.
Warwick State Forest (1.5 Acres in southeastern Northfield)	Hiking, etc.	Wildlife Habitat	Historic Recreation/Conservation Landscape

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
Bennett Meadow Wildlife Management Area	Wildlife viewing; nature programming; seasonal hunting; stocked with pheasant	Wildlife Habitat	Early settlements; Native American remains and early granaries discovered here.
Pauchaug Brook Wildlife Management Area	Wildlife viewing; seasonal hunting	Major-River Floodplain Forest	Native American camps during French & Indian War; Native corn fields and tribal dancing grounds.
Pauchaug Brook Public Access Boat Ramp	Access to Connecticut River		Native American encampments.
Satan's Kingdom Wildlife Management Area	Hiking; wildlife viewing; seasonal hunting		
New England National Scenic Trail (Metacomet-Monadnock Trail)	Long distance hiking; Scenic views; Nature study		
Crag Mountain & Trail	Hiking; Scenic views; Picnics	"rouche moutanee" Glacially carved ridge	Lookout Post
Hobo Waterfall Formerly "Cascades"	Hiking trail from Old Wendell Road	Unusual rock formations	A sacred site originally named "Hobomock Falls" by Native people. Site of ice cutting (above the falls).
King Phillip's Hill	Hiking; Picnicking	Geologic interest	Site of King Phillip's lookout during French & Indian War
Minot Brook Trail	Hiking; nature study		
Strowbridge Hill Area	Hiking; cross-country skiing; snowmobiling		See "History of Northfield" pp. 7 and 355 for historical significance.
Mill Brook Nature Trail	Hiking; nature study cross-country skiing; snow shoeing; birding	Significant birding site	Early Native then later Colonial settlement.
Camp Northfield and Thomas Aquinas College	Church-sponsored religious camp		Historic Recreational Landscape
Northfield Elementary School Grounds	Playground; baseball field; soccer field; basketball court		
Kiwanis Park	Picnicking; hiking; Pavilion; Play structure		
West Northfield Park	General playground; sports field; picnic area; pavilion		

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
Northfield Golf Course	Nine hole course; cross-country skiing		Historic course, formerly part of Northfield Inn and near Schell Chateau.
Northfield Connector of Franklin County Bikeway	Bikeway consisting of shared roadway with links to Northfield Mountain Recreation Center, down-town Northfield and Thomas Aquinas college campus		
HISTORIC AGRICULTURAL LANDSCAPES			
Along Routes 63 and 10			Historic Agricultural Landscape
Along Route 142, West Northfield Area			Historic Agricultural Landscape
Caldwell Road			Historic Agricultural Landscape
East Northfield Road			Historic Agricultural Landscape
Great Meadow Road			Historic Agricultural Landscape
Coller Cemetery area			Historic settlement area
South Mountain Road			Historic Agricultural Landscape;
Old Wendell Road near Erving line			Historic Agricultural Landscape
Pine Meadow Road			Historic Agricultural Landscape
River Road			Historic Agricultural Landscape
Upper Northfield Farms Road			Historic Agricultural Landscape
Along Connecticut River			Historic Agricultural Landscape
Cow Plain, between Pine Meadow Road and Millers Falls Road			Believed to have been used as an agricultural site by Native Americans.
HISTORIC BURIAL GROUNDS			
Graves of Dwight L. Moody and Emma G.R. Moody		On property currently owned by the Moody Center.	
South Mountain Cemetery		No longer active	

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
Center Cemetery (Moody Cemetery)			Early 18th c. gravestones are considered some of the earliest form of European American sculpture; abuts location of one of the Town's five original train stations.
Coller Cemetery		No longer active	
Northfield Farms Cemetery			
St. Mary's Cemetery			
Burial Place, Captain Beers		154 South Mountain Rd.	Formerly Redemption Christian Academy and before that, Linden Hill School
Gill Rd Cemetery Pentacost Cemetery West Northfield Cemetery			
HISTORIC COMMUNITY DEVELOPMENT / CONSERVATION / SCIENCE / INDUSTRIAL LANDSCAPE			
Main Street National Historic District	Walking; Franklin County Bikeway		Historic Community Landscape; National Register of Historic Places (Approx. two miles in length, the District contains 148 historically significant properties and structures.)
King Philips Hill	Scenic views Hiking; Birding		Historic Community Development Landscape; National Register of Historic Places
HISTORIC TRANSPORTATION LANDSCAPE			
Schell Bridge	Planned pedestrian crossing Connecticut River		Historic Transportation Landscape; Rare original design
East Northfield Road Railroad Bridge			
Central Vernon Railroad Bridge			
Route 63 Bridge			
Birnam Road Bridge	Over Mill Brook; scenic		
OTHER HISTORIC SITES			
24 Main Street	Vacant as of Feb. 2020		Significant historical site. Original Native palisade prior to contact with European explorers; later an English fort was erected.

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
136 Main Street	Currently Nfld Post Office		Early grist mill on site; second fort location on property immediately to the south—see stone marker.
Simeon Alexander House			National Register of Historic Places
Northfield District Schoolhouse #2			National Register of Historic Places
Pratt Hollow			
Native American Council Fires off Rt. 63	Near handicapped accessible trail	Adjacent to beaver pond/ wetland complex	Historic Native American Site
Original Fire Station	Current Boy Scout House		Built 1928 and used until 1953. Dedicated in 2018 by Nfld Historical Commission.
UNUSUAL GEOLOGIC FEATURES			
Ice House Cave			
Rattlesnake Den	Near Brush Mountain		
Garnet Rock	West of Notch Mountain in Northfield State Forest		
Ravines off of Bennett Brook and Mallory Brook	Steep ravines formed by receding glacier at north end of historic Lake Hitchcock		
SCENIC VIEWS			
Pauchaug Brook and Wanamaker Pond			
Crag Mountain	On the New England National Scenic Trail; Views of western Mass		
Mill Brook at confluence with Connecticut River	River views	Wildlife	
Northfield mountain ridges from east on Rt. 10			
Hogback Mountain	Hiking; Views	Wildlife	
Notch Mountain	Hiking; Views	Wildlife	
St. Mary's Road to East St.			
East St. to St. Mary's Road			

Location of Landscape	Landscape with Significant Recreational and Scenic Value	Landscape with Significant Natural and Ecological Value	Landscape with Significant Cultural and Historical Value
Pine Meadow Rd down CT River toward French King Bridge			
Mount Herman Station Rd. looking east toward river			
South Mountain Rd looking west from Fisher Rd.			
SCENIC ROADS			
Rt. 63 - Connecticut River Scenic Farm Byway			
Old Vernon Road			
Warwick Road			
Pine Meadow Road			
Four Mile Brook Road			
South Mountain Road			
Old Wendell Road			
Gulf Road			
Rt. 142/ Mount Herman Station			

H. ENVIRONMENTAL CHALLENGES

One of the values of an open space and recreation planning process is that there is an opportunity to explore the perceptions and experiences residents have regarding their environment. Environment can be defined to include all of the areas of town that people know and come into contact with; special places held in high regard; and, the general construct or idea of the environment, and all that that contains, including the air, water, soil, vegetation, and plants and animals, as well as the quality of those resources and the values associated with them.

Given the potential impact on recreation and open space in town, this plan inventories a range of environmental problems within the following four categories: Existing environmental regulations; Development in the town and region; Protection of drinking water supplies; and, Erosion along the Connecticut River.

Non-Point Source Pollution and Impaired Water Bodies

Every stream, brook, and river in Northfield continues to be threatened by non-point source pollution from residential and agricultural runoff; from sedimentation; and particularly, from road salt washing into the town's wetlands and waterways. Roads in Northfield lack curbs, and generally slope down toward low-lying, wetland areas. Road sand or salt that remains on the streets and does not get reclaimed often washes into the adjacent lands and waterbodies. It would be in the interest of the Town to conduct a study to determine what amount of sand and salt are being deposited into wetland resource areas, and to compare that against the salinity thresholds for the various plant and animal species present.

Low Impact Development (LID) is a group of land use development techniques that capture water and rainfall on site, filter it through vegetation and let it soak into the ground before entering the water table. Benefits include improved water quality, reduced flooding, and potentially lower construction costs than a conventional stormwater management system. The Town should consider incorporating Low Impact Development (LID) techniques into town land use regulations and implementing LID as part of town projects when feasible, as a means of addressing non-point sources of pollution affecting both natural resources and private property.

The Connecticut and Millers Rivers are both Category 5 in the DEP 2016 Integrated List Rivers, indicating waters requiring a TMDL.

Flooding, Erosion, and Sedimentation

Erosion on the Connecticut River[27]

The Turners Falls dam, located near the bridge into Turners Falls between Montague and Gill, and the Vernon Dam in Vernon, Vermont form a 22 mile long impoundment in the Connecticut River that is referred to as the Turners Falls Impoundment (TFI) or the Turners Falls Pool. This impounded reach of the river includes the Franklin County towns of Montague, Gill, Northfield and Erving. The Northfield Mountain Pumped Storage Project, completed in 1970, is located about five miles upstream of the Turners Falls dam. Since the Northfield Mountain Pumped Storage Project came on-line in 1972, landowners in Northfield and Gill have watched their prime farmland soils and mature riparian trees slump and topple into the Connecticut River. Less dramatic but no less distressing is the erosion of shoreline around Barton Cove in the towns of Montague and Gill. In Erving, the Connecticut River flows through the French King Gorge, which is bedrock, and thus less prone to erosion. The Millers River empties into the Connecticut in Erving.

The intake structure (tailrace) of the Northfield Mountain Pumped Storage facility is located in Northfield near Four Mile Brook. The hydropower project sucks up enormous volumes of water from the lower reservoir (the Connecticut River) to the Northfield Mountain Reservoir upper reservoir (elevation 1,000 feet) that is located atop Northfield Mountain. The 300-acre upper reservoir holds 5.5 billion gallons of water. During periods of peak demand, water is released to the lower reservoir via the turbines to generate electricity. The power generating/pumping facility is located completely underground and consists of four 250 thousand kilowatt reversible pump turbines. Each of these turbines can pump a maximum of 22,500 gallons per second of river water up to the upper reservoir. To generate electricity, each turbine can discharge water from the upper reservoir back to the river at a maximum rate of 33,700 gallons per second. This cycle of pump and release results in river level fluctuations that erode and destabilize the river banks. Typical pool fluctuations average 3.5 feet per day. Much higher pool fluctuations, on the order of 9-10.5 feet, may occur over the course of the weekly pump/release cycle. Combined with the highly-erodible, prime farmland soils and bank sediments along this reach of the Connecticut River, the dramatic daily fluctuations in water surface elevations have led to severe bank erosion in which riparian buffers and adjacent farmland have been steadily undermined and continually collapsing into the river. Land owners have been losing land along the river for decades, and bank stabilization efforts have had limited success in stopping the loss of this land.

Citizens along the Connecticut River have been voicing concern about the erosion issue since the early 1970's and successfully lobbied congressional representatives to get the Army Corps of Engineers (ACOE)to assess the causes of streambank erosion. The 1979 Army Corps of Engineers, "Report on: Connecticut River Streambank Erosion Study, Massachusetts, New Hampshire and Vermont" presented the results of a detailed study of the numerous variables that contribute to the bank erosion in this reach of the Connecticut

[27] The following technical description was developed by the Natural Resources Program of the Franklin Regional Council of Governments Planning Department for this Open Space and Recreation Plan for the Town of Northfield.

River. One of the six index sites evaluated by the ACOE was located in the Turners Falls Power Pool approximately eight miles upstream of the Turners Falls Dam. The study determined that significant changes in river water surface elevations (impoundment fluctuations due to hydropower operations) were the second most important cause of the streambank erosion.

Efforts during the 1990's by the Connecticut River Streambank Erosion Committee, which was convened by the Franklin Regional Council of Governments, succeeded at pressuring FirstLight Power Resources (FirstLight) to participate in the implementation of bioengineering techniques to stabilize the streambanks at several sites on the river. Bioengineering incorporates woody and/or herbaceous plants and plant materials to repair eroded streambanks and establish a living system of bank protection. The success of these projects, and others attempting to stabilize eroding banks with conventional practices in recent decades has been limited. The remaining issue regarding erosion along the banks of the Turners Falls Power Pool is that erosion is occurring at a faster rate than the completion of the river bank bioengineering restoration work. The full restorative work takes time to do correctly and will require funding as well as long term commitment by FirstLight Power. Best strategies for stemming the erosion by faster, less expensive means in advance of the full bioengineering method must be discussed and planned with FirstLight and community stakeholders.

FirstLight Power owns the Turners Falls dam, Cabot Station and Station No.1 (collectively this hydropower project is referred to as the Turners Falls Project) and the Northfield Mountain Pumped Storage project. These facilities are not the only hydropower projects that affect the river as it flows through Franklin County. FirstLight's projects are part of a broader system that includes three other hydropower projects in Vermont and New Hampshire, which together affect the flow and bank stability of nearly half of the 410-mile Connecticut River. The Federal Energy Regulatory Commission (FERC) licenses for all five of these projects are up for renewal. The FERC relicensing process for these five projects started in 2012 and is just coming to the end stages in late 2020 – early 2022. To date, the FERC relicensing process for these five projects has included 72 studies and thousands of pages of data.[28] The adjacent image, courtesy of the Connecticut River Conservancy (CRC), shows the locations of the five projects.

FirstLight submitted the Amended Final License Applications (AFLAs) for their two hydropower projects to FERC in early December 2020. These documents and all related documents going back to the beginning

[28] https://www.recorder.com/my-turn-fisk-FirstLight-TurnersFallsDam-33905989

of the relicensing process (2012) are available at FirstLight's relicensing website.[29] While the AFLA for the Turners Falls project includes strategies to address water surface elevations, improve fish passage and habitat resources for endangered species in the project area south of the Turners Falls Dam, Cabot Station and Station No.1, the AFLA for Northfield Mountain does not include any strategies for addressing streambank erosion in the TFI. FirstLight did an erosion causation study as part of relicensing, but stakeholders, including landowners, FRCOG, CRC and the towns expressed their strong skepticism of the analysis and FirstLight's use of the Bank Stability and Toe Erosion Model (BSTEM) to parse out responsibility for erosion. According to FirstLight, the BSTEM analysis found that the major cause of erosion in the TFI was attributed to either naturally high flows or boat waves and that project operations are not a major cause of erosion anywhere in the TFI except for at only two sites. FirstLight claims that the first of these sites has already been remediated under the existing license, and that its operating regime contributes only 8% of the erosion processes at the second site. FirstLight considers 8% to be a negligible amount of erosion attributable to their proposed operations and is not proposing any additional erosion remediation measures. Stakeholder groups, landowners and local officials are not pleased with FirstLight's refusal to take responsibility for erosion in the TFI and refusal to properly steward a treasured public resource, the Connecticut River, which generates hundreds of millions of dollars in revenue each year. In fact, FirstLight is proposing to pump additional water from the river up to the upper reservoir to use the full capacity of the upper reservoir while proposing no changes to the 9-ft water level fluctuation (pump & release cycle impacts to the river) allowed in their current license.

Environmental impacts from project operations are not stakeholders' only concern. The Connecticut River is an important recreational resource and a key economic driver in Franklin County's natural resource and recreation based tourism economy. In their AFLA, FirstLight proposes to maintain their existing recreational facilities in Northfield, Montague and Gill (which were installed in the late 1970's) and fund only ongoing maintenance needs. The Americans with Disabilities Act (ADA), which became law in 1990, was not in effect at the time these facilities were built. The relicensing process is an opportunity to evaluate the ADA needs of the existing recreation facilities and propose upgrades, but FirstLight did not do this. Please see *Section 7, Summary of Community's Need*, for a detailed discussion of FirstLight's role in important recreational assets in Northfield and the importance of meeting ADA accessibility standards.

Chronic Flooding and Sedimentation

The Connecticut River running through Northfield is not functioning as a natural body of water as a result of being used as a controlled basin for energy production at the Northfield Mountain Pumped Storage facility. Fluctuating water levels have some negative environmental effects on water quality and wildlife and are a deterrent to recreational use of the river, but are entirely managed by the utility company, FirstLight Power Resources. Sedimentation is a problem at Pauchaug State Boat Ramp, the most heavily used recreational boat launch located in the northeast of town requires fairly frequent dredging.

[29] http://www.northfieldrelicensing.com/Pages/default.aspx

Since the 1936 and 1938 floods along the Connecticut River a system of upriver dams and catch basins has largely succeeded in controlling the most serious natural floods but the flood plains in the area are occasionally impacted by seasonal flooding episodes and building is regulated in those areas. The flood plains are rich agricultural fields being actively farmed in some cases. It is the goal of the OSRP to maintain as preserve this land for cultivation or silviculture whenever possible through use of Agricultural Preservation Restrictions (APR's).

Four Mile Brook Road parallels Four Mile Brook and has been a concern for Mass DEP and the Town of Northfield for some time as a possible cause of sediment run off into the river. Grant funds were acquired to do a thorough study of the road and its impact on the brook. Best Management Practices (BMP's) were used in the implementation of a road improvement project along Four Mile Brook Road installing adequate roadway/slope storm water management for erosion and sediment control.

Invasive Species

Northfield's woodlands have begun to suffer from invasive, non-native plants, which can outcompete the native vegetation and interrupt natural succession if they escape into natural areas to reproduce. The species presently seen in the woods and wetlands are barberry, multiflora rose, burning bush euonymus, Norway maple, Japanese (and other) honeysuckle, Asiatic bittersweet, Japanese knotweed, buckthorn, phragmites, garlic mustard, purple loosestrife, black swallowwort, and mile-a-minute plant. The invasions of autumn olive and Russian olive frequently seen in the highway right-of-way in the Pioneer Valley are not yet such a problem in Northfield. Most of the above-named plants, as pure stands, do not have the same wildlife habitat or timber value as the indigenous plant species. Other pests include the beech fungus which has rendered a once economically important species almost useless, and the Emerald Ash Borer, which will be here soon, if not already. Invasive species in Northfield are known to occur in significant extents in the following locations: Millbrook Area, the area known as Wanamaker Lake, West Northfield.

Hemlock pests may have significant consequences for Northfield's forests, especially in the wooded ravines and wetlands. The hemlock wooly adelgid is killing virtually all hemlocks in PA, NY, NJ, and CT. According to experts at Smith College, the wooly adelgid arrived into the Springfield area from Connecticut in the early 1990s. Since then, it has extended its range north to Amherst and Northampton, and the limit of its cold hardiness is likely to be farther north than Northfield, where it is now found. Another threat to the hemlocks has been the hemlock looper, which has killed over 1,000 acres of hemlock in Franklin County.

Hazardous Waste, Brownfield Sites, Landfills

As defined by the U.S. Environmental Protection Agency (EPA), "Brownfields" are properties that the expansion, redevelopment, or reuse of may be complicated by the actual presence or perceived potential presence of a hazardous substance, pollutant, or contaminant. The Massachusetts Department of Environmental Protection (DEP) has nine

waste sites and reportable releases documented in Northfield[30] between 2015 and 2019 which have a "PSNC" compliant status, indicating that a statement was submitted asserting that response actions were sufficient to achieve a level of No Significant Risk for all current and foreseeable future uses of the site without the need to restrict the use of the property. This includes Rice Oil, the former gas station at 24 Main Street where there was seeping/dumping of oil and gas, Lane Construction on Mt. Hermon Station Road, Northfield Mountain Substation and Northfield Mountain Recreation and Environment Center, and the gravel pit on Mt. Hermon Station Road. This latter site involving discarded creosote soaked railway ties at the Mitchell Aggregate LLC Rail Road Tie Disposal Site, is now closed with a land use restriction that limits activity and use and is in Phase V of the cleanup process. During Phase V: Operation, Maintenance, and/or Monitoring, long-term treatment processes are implemented and monitored to track cleanup progress[31]. There have been ten notifications reported to DEP between 2001 and 2012 which have reached a "RAO" compliant status, indicating that a statement was submitted that asserts that response actions were sufficient to achieve a level of no significant risk (for Permanent Solutions) or at least ensure that all substantial hazards (for Temporary Solutions) were eliminated. This includes S&W Texaco, another former gas station, at 190 Main Street where there was seeping/dumping of oil and gas.

In 2018, 314 Caldwell Rd, a 2.49 acre site underwent Phase I and Phase II environmental site assessment conducted by Tighe & Bond as part of the FRCOG's Brownfield Program. The site had a significant accumulation of junked vehicles and tires, was privately owned, and was obtained by the Town through a tax taking. There were town records indicating that solvents and oils were stored improperly with the potential to impact soil, groundwater and surface water. A Phase II was conducted that did sampling and testing after much of the debris had been removed. There were no MCP (Massachusetts Contingency Plan) reportable concentrations found. A follow up was conducted on an area with soil staining, and it concluded that there were no reportable concentrations. However, in their Phase II Addendum, Tighe & Bond stated that "although no regulatory reporting requirements exist with respect to the limited area of gasoline impacted soil, Tighe & Bond recommends removal of these soils as part of a future property sale or site development.

According to the Northfield Open Space Committee, there was also a landfill associated with an old laundry belonging to Northfield Mount Hermon. The site was just north of the Schell Bridge, between the bridge and Pauchaug Meadow. It was land that the Community Park Committee was interested in for its location, but the landfill was a deal-breaker for the select board. This site would likely be eligible for the FRCOG Brownfields Program, and the Town can request that it be considered for assessment. The Brownfields Program is funded through competitive EPA awards, conducts assessments only, and cannot fund cleanup if contamination is found.

The DEP Bureau of Waste Prevention, Solid Waste Program does not list any other Active Landfills in Northfield (see Facility Master File, June 2012).

[30]https://eeaonline.eea.state.ma.us/portal#!/search/wastesite/results?SearchType=All%20Sites&TownName=NORTHFIELD

[31] https://www.mass.gov/doc/understanding-the-waste-siterelease-look-up-search-results/download

Forestry Issues

According to the *Massachusetts Climate Change Adaptation Report,* climate change impacts to New England forests could include changes in forest structure, more frequent droughts associated with forest fires, and invasive insects and diseases. Under this challenging horizon, attempting to manage forestlands for timber production, carbon sequestration, biodiversity, and resilience simultaneously will involve compromise in some values. While active management is not suitable for all lands, sustainable forestry is one approach to increase resilience to climate change through improving wildlife habitats, eliminating invasive species, helping to control the spread of disease, and increasing the ability of forests to store carbon.[32] Sustainable forestry means keeping forests healthy, dynamic, and available for future generations. It addresses all of the resources provided by forests, including habitat, clean water and air, recreation, timber, jobs, and scenic beauty, and seeks to keep viable all of these options and opportunities.[33]

Challenges to practicing sustainable forestry in Northfield and the greater region include:

- A lack of local markets for low-grade wood, such as pellets, laminate, and other products that could be made from small diameter trees, which would make sustainable long-term management more financially feasible;
- The need for assistance for local loggers and sawmills to upgrade equipment, cover insurance and energy costs, and meet regulations; and
- The need to educate landowners and the public about the benefits of working forests and sustainable active forest management.

Other landowners may choose to manage their forests without extracting timber, simply eliminating invasive species but making few other interventions. If the region were to develop carbon offset markets as some other areas have, it may become economically viable for individuals to retain land ownership of large forest tracts without selling the timber. This approach would decrease the risk of invasive species encroachment, soil compaction, and habitat fragmentation of interior forests that can occur during timber harvests.

Public Lands

There is a substantial amount of public forest land in Northfield, including parcels in the eastern region of town in the Bald Hills Region, and in the northwestern part of town called Satan's Kingdom. Most of the State Forest in Northfield has been zoned as woodlands, meaning that timber-harvesting activities can be conducted on these properties. Although harvesting is possible, the state conducts very little harvesting at

[32] Hines, S.J.; Daniels, A. 2011. Private Forestland Stewardship. (October 10, 2011). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center. www.fs.usda.gov/ccrc/topics/forest-stewardship/.

[33] *Diameter Limit Cutting and Silviculture in Northeastern Forests: A Primer for Landowners, Practitioners, and Policy Makers*. USDA Forest Service, 2005; *What is Sustainable Forestry?* Peter J. Smallidge, NYS Extension Forester, Cornell Forestry Extension Program.

this time due to political pressures and a lack of staffing. Over time, the trees might be damaged by storms, disease, or pests, or increase to unmarketable dimensions, perhaps changing the goal of management from forestry focused on the sale of forest products to stewardship for recreation, wildlife habitat, biodiversity, and carbon storage.

Northfield established a 150 acre Town Forest on the western slope of Brush Mt. with help from Mount Grace Land Conservation Trust with funding through the Forest Legacy Program. The Town Forest has a Forest Resource Management Plan.

Private Lands

It can be difficult for a private landowner to justify maintaining ownership of forestland due to increasing costs of owning land. Maintaining roads and boundaries, keeping up-to-date management plans, and paying property taxes can create a situation where landowners may consider options such as selling or developing their land. Chapter 61 and the Forest Stewardship Program can help to alleviate some of these issues by reducing property taxes and sometimes providing cost-sharing funds for property improvement and maintenance. By providing incentives to landowners, more private forest lands will be maintained as such, helping to protect the open space that gives Northfield its rural character.

Another issue is a lack of local markets for forest products. More and more, timber that is harvested in this region is put on trucks and hauled to Canada to be milled into lumber. This is due to the fact that there are fewer local mills in the area. The lack of markets causes wood products to return less revenue to the landowner. This can result in landowners deciding not to harvest timber, and eventually may cause landowners to sell their land.

Environmental Damage From Recreational Uses

Illegal Use of Off-Road-Vehicles

Northfield residents are concerned about the impacts on the environment and on their quality of life caused by people not following regulations intended to maintain trails, parks, rivers and recreational facilities. For example, the Massachusetts Department of Conservation and Recreation regulates Motorized Off-Road Vehicle (ORV) use, permitting them within eight State Forest management areas, none of which are found in Franklin County. Unfortunately, residents report that All-Terrain-Vehicles (ATVs) have been observed on trails both tracts of the Northfield State Forest and in the Town Forest. ATVs are known to cause damage to trails and rare species habitats and the noise associated with their engines reduces the sense of quiet that residents have come to appreciate about Northfield. The Pauchaug boat launch on the Connecticut River is another area that is misused with people driving their vehicles onto the beach.

Unregistered Vehicles and illegal storage of vehicles

For both residents and visitors, the presence of litter and trash in and around town reflects poorly on Northfield. In addition, abandoned cars can present an eyesore. The Town

needs to better enforce its existing regulations that deal with unregistered vehicles and with Zoning Board of Appeals conditions to permits.

The solution to all of these problems lies not in further regulation but in education. The first step may be to foster a general awareness of the problems of trail misuse and noise pollution associated with illegal motorized vehicle use. A concerted educational outreach effort by the Select Board, the Open Space Committee, and the Zoning Board of Appeals could produce a consistent message for residents and visitors regarding the proper use of open space and recreational resources. By raising residents' knowledge of the issues, more people could be on the watch for illegal or inappropriate behavior, and could then report any problems to the Environmental Police or other authorities.

Illegal littering and dumping

Littering continues to be a problem along main thoroughfares as well as illegal dumping in secluded areas despite efforts by the Board of Health to hold bulky waste collection. The Town of Northfield is on record supporting the Massachusetts legislature effort to expand the bottle bill to include water bottles and waxed drink boxes. Locally, groups sponsor annual cleanup efforts but more public outreach and enforcement of litter laws is needed to change behavior.

Environmental Equity

Environmental Equity means taking a look at conservation and recreation opportunities available in the town and determining if there are areas that seem to be lacking resources. Residents may be unable to afford recreational opportunities that require a fee, and may lack transportation to open space and recreation resources in other areas of town. It is therefore important to ensure free access to an adequate amount of well-maintained open space and recreational resources within walking distance of homes in these areas.

According to MassGIS, there are no Environmental Justice populations identified in the Town of Northfield. That notwithstanding, concerns about the high cost of land and homes in Northfield has led the Town to establish programs that provide grants to home buyers (who do not own any other homes at the time of closing) and down payment assistance, administered through the Franklin County Regional Housing & Redevelopment Authority (HRA) and using the town's Community Preservation Act funds. The Down Payment Assistance program offers a 0% interest loan on 5% of the purchase price of a home (costing no more than $280,000) to all income eligible persons. The Mortgage Buy Down program uses a lottery system to offer grants of 20% on the sale price of a home (maximum grant of $50,000; home sale price of no more than $270,000) to eligible persons in exchange for a deed restriction mandating that the property remain permanently affordable.

Since Northfield currently has no public parks, the main public recreation facilities in the town are the trails and Town Forest. These are in rural areas and thus roughly equally accessible to all residents - a means of transportation, usually car, is needed to access these resources.

Envisioned in Northfield's 2014 Master Plan[34] is the creation of a comprehensive community park. This would likely be located near the town center and would be convenient for about half of the town's population, comprising all economic groups.

Though Northfield has extensive frontage on both sides of the Connecticut River, there currently are no riverbank trails. There is considerable interest in developing such trails, and should that happen, these would be convenient for almost all residents of the town.

New Development

There are several impacts of development in town and in the region that are considered by many residents to be a central reason for any open space planning process: habitat fragmentation, increases in traffic on the highways in town by trucks and passenger vehicles; and the lost use of prime farmland soils.

Northfield's Forested Wildlife Habitats are Vulnerable to Development

Northfield's Open Space and Recreation Plan identifies eight Core Habitat areas and large blocks of forest that contain rare species habitats and that are unprotected from development. Approval-not-required lots, or those that are developed with frontage on existing public ways, represents the dominant pattern of development in Northfield today, especially along West Road, South Mountain Road and Old Wendell Road. Although this form of development tends to widen the influence of road corridors, the fragmentation quality of this linear pattern of home construction is much less than subdivisions, which are being developed in towns to the south and the east. To reduce the future impact of subdivisions, the Town has amended their zoning bylaw to increase incentives for use of their cluster development measure. The Town also participates in local and regional land conservation efforts and works to educate landowners about their land preservation and estate planning options.

Traffic Issues on Routes 63, 10, and 142

Routes 63, 10, and 142 carry large truck and passenger vehicle traffic north and south. People traveling to southern New Hampshire from eastern Franklin County invariably travel through Northfield. Were these roads on the fringe of town, their impacts would not require as much attention. However, these roads bisect the community and represent significant linkages for residents to and from different portions of town. Route 63/10 is Northfield's Main Street. Although the noise pollution accompanying the traffic may not be easily rectified except through perhaps tree and shrub plantings within the district, the speed at which the vehicles move through the center of town could be addressed through traffic control mechanisms similar in style to those applied in downtown Greenfield. There, bricks and tree plantings jut in towards the main thoroughfare resulting in vehicles creeping over pedestrian crossways. A recent Main Street sidewalk project included tree

[34] https://www.northfieldma.gov/sites/northfieldma/files/uploads/a_master_plan_for_northfield.pdf

plantings and the delineation of parking places at the center of town. Signs forbidding trucks to use “compression release" engine brakes would significantly reduce noise.

Northfield’s High Quality Farmland Soils Are Vulnerable to Development

Prime farmland soils yield more food and feed crops per acre with less inputs resulting in less damage to the environment than other soils. These prime soils are located mostly along the Connecticut River in Northfield. Once these soils are developed, they might provide for productive back yard gardens at best. Typically, farms and farmland are viewed as a feature of a town’s landscape valued for their scenic and economic contributions to the community. What is often missing from that assessment may prove over time to be the most critical: the land’s capacity to grow food. The Town of Northfield contains some of the best food producing soils in the world. As these soils become developed, that capacity is lost, as is a part of the town’s and the region’s food producing self-reliance. The Town may want to consider all of the ways it could help to conserve these soils over time: support of farm businesses, use the town’s right-of-first refusal with Chapter 61A farmlands, set aside match funds each year to help attract APR funds for farmers that want to protect their land, etc.

Protection of Drinking Water Supplies Against Contamination

Aquifers lining both eastern and western shores of the Connecticut River contain significant fresh water resources and require vigilant environmental protection. The Town does not own its own drinking water resources and relies on informed and responsible private management of a town well and the Grandin Reservoir.

Northfield’s drinking water supplies are vulnerable to contamination. Grandin Reservoir can be accessed via one road and several ATV trails. It is unknown at this time what types of regulations are imposed on traffic on these roads. The Northfield Water District’s groundwater supply is perhaps even more vulnerable to contamination because the potential sources of pollution include impacts of everyday activities: lawn fertilizers, fungicides, and other pesticides, septic problems, motor oil and hydraulic fluid spills, etc. Because the well and its recharge area are located within the eastern part of Northfield Center, farmland, a road, and residences are found within the Zone I wellhead protection area, an eleven-acre circle of land designed to protect a source from contamination. Again, the solution to this problem may be education directed in a focused way to all of the residents located in the Zone I and II, as well as others in Northfield Center. Buried railroad ties east of Rt. 142 might contaminate the extensive aquifer beneath them. There is also concern that the mineral, gravel & sand removal in W. Northfield is removing the soil and rock filter for groundwater supplies in general.

SECTION 5

INVENTORY OF LANDS OF CONSERVATION AND RECREATION INTEREST

A. Introduction

Open space in Northfield consists of forests, farms, conservation lands, and recreation areas under both public and private ownership and management. This section of the Northfield Open Space and Recreation Plan (OSRP) inventories and categorizes parcels of undeveloped land and open space by ownership, use, and level of protection from development. It identifies parcels of undeveloped land that are individually, or in the aggregate, considered to be of interest because they help conserve ecosystems and ecosystem services, scenic landscapes, the area's rural character, and current and future recreation resources for Northfield's residents. Lands of conservation interest are those parcels of land that are considered important because they are already protected from development or because they could be a priority for protection.

Communities across the country have determined that protecting land from development is a means to ensure certain aspects of their landscape are conserved. Open space and recreation plans typically identify areas of undeveloped land that contain precious natural and recreational resources and prioritize them for protection. This includes undeveloped land, which provides actively managed farm and forestland, wildlife habitat, protection and recharge of groundwater, public access to recreational lands and trail systems, important plant communities, structures and landscapes that represent the community's heritage, flood control, and scenery.

Protected land has legal restrictions that prohibit the parcel from being developed for residential, commercial, or industrial uses. 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: the land may be owned by a state conservation agency, a conservation land trust, or a municipal conservation commission; or, a conservation restriction may be attached to the deed. Town-owned land with recreational purposes stated in its deed is permanently protected under Article 97. A vote of two-thirds of the State legislature is required for any development to occur on these protected parcels.

This section provides a comprehensive inventory of the lands that provide open space, wildlife habitat, agricultural and forest products, watershed protection, scenic beauty, and recreation opportunities for the benefit of all of Northfield's residents. The inventory accompanied by the Open Space Map shows the location, types, and distribution of conservation lands in Northfield. This inventory is divided into two main sections based on type of ownership: 1) private, and 2) public and non-profit. Within each of these major

categories, parcels are differentiated by use (farm or forestland), by ownership and management, and by level of protection: permanent, limited, and temporary (See Table 5-1).

Most natural processes do not follow political boundaries, but land ownership is an important consideration for Town officials who aim to protect land for conservation purposes. Land owned by DCR or MassWildlife is considered to be permanently protected from development, while privately owned land is only permanently protected if a conservation restriction is attached to its deed. Although other factors relating to ownership are important to consider for open space planning purposes, such as level of management and public access, these are often considered secondary to the level of protection from development. This is because development can have a permanent impact on natural and cultural resources.

All municipal property must be accessible to people with disabilities. The municipal parks and conservation areas in Town were evaluated for accessibility by the Franklin Regional Council of Governments. The results of the evaluation and recommendations for improvement are located in Appendix A of this OSRP. The Town of Northfield does not have any identified environmental justice areas. Protected open space is located throughout Northfield. Land with limited and temporary protection is available close to the village center in town.

The only truly protected land is that land which is preserved in perpetuity, such as that land protected by an Agricultural Preservation Restriction (APR) or a Conservation Restriction (CR). Total land under permanent protection through APR and CR in Town is equal to approximately 1,205 acres, or 5.33 percent of the total land area of Northfield and 9 percent of the total open space in Northfield. While there is significantly more land under temporary protection (a total of approximately 6,179.71 acres, all privately owned), that land is subject to possible future development once the manner of temporary protection has expired.

Picking Potatoes *(Jerry Wagener)*

The portion of the total land area that is protected as open space is summarized in Table 5-1. It is divided into two main sections based on type of ownership: private and public. Within each of these major categories, parcels are differentiated by use (farm or forestland), by ownership and management, and by level of protection: protected, limited, and temporary.

Table 5-1: Summary Areas of Farmland and Forest Open Space by Ownership and Level of Protection from Development

PRIVATELY OWNED PROTECTED OPEN SPACE	Area in Acres
Farmland	
Permanently Protected by Agricultural Preservation Restriction	***438.03***
Temporarily Protected under Ch. 61A	***2,453.18***
Forestland	
Permanently Protected by a Conservation Restriction	***766.9***
Temporarily Protected	***3,726.56***
Chapter 61	2765.96
Chapter 61B	960.6
Total Temporarily Protected (Ch.61, 61A, 61B)	**6,179.51**
Land with Limited Protection (water supply)	***243.0***
TOTAL PRIVATELY OWNED PROTECTED OPEN SPACE	**7,627.67**
TOTAL PRIVATELY OWNED PERMANTENTLY PROTECTED OPEN SPACE	**1,204.93**
PUBLICLY OWNED PROTECTED OPEN SPACE	
Permanently Protected by State Conservation Agencies	***4,175.48***
State Department of Conservation and Recreation	3,171.06
State Department of Fisheries and Wildlife	1,004.42
Land Permanently Protected & Owned by Town of Northfield	***196.0***
Land with Limited Protection & Owned by Town of Northfield	***233.14***
Town Lands	36.67
Cemeteries	22.87
Water District	173.6
TOTAL PUBLICLY OWNED PROTECTED OPEN SPACE	**4,604.62**
TOTAL PUBLICLY OWNED PERMANENTLY PROTECTED OPEN SPACE	**4,371.48**
TOTAL OPEN SPACE	**12,232.32**
TOTAL PERMANENTLY PROTECTED OPEN SPACE	**5,587.11**

Source: Town of Northfield Assessors Records; June 2020.

A.1 PERMANENTLY PROTECTED LAND

Land permanently protected from development may be owned by a state agency or by the Town. For example, Northfield State Forest and Satan's Kingdom are owned by the Commonwealth of Massachusetts, and are under the management of the Department of Conservation and Recreation (DCR) and the Division of Fisheries and Wildlife (DFW). Land owned by the Town of Northfield, including Northfield Town Forest, is under the authority of the Conservation Commission is also considered to be permanently protected from development under Article 97 regulations, which requires a two-thirds majority vote of the State Legislature to convert open space to another use.

Farmland can be permanently protected from development when a landowner chooses to sell his/her development rights to a land trust or state agency. The Massachusetts Department of Agricultural Resources (MDAR) purchases the development rights of

farmland through their Agricultural Preservation Restriction (APR) Program. The APR Program typically pays the landowner the difference between the market value and the agricultural value of the land**.** MDAR favors towns that provide matching funds, which are typically 5 percent of that amount or up to $500 per acre. Northfield's Community Preservation Act Funds can be used as a match for this program. In this way Towns can leverage 95 percent of the cost of purchasing development rights towards protecting the farmland of willing landowners. Currently there are 26 privately owned parcels in the APR program in Northfield with a total of 438.03 acres of permanently protected farmland.

A.2 TEMPORARILY PROTECTED LAND

Land considered to be of limited protection includes any Town-owned open space that is not under the authority of the Conservation Commission, which could be developed through a decision by the Select Board or by Town Meeting vote. Examples of Town-owned open space include cemeteries, small parks, and old landfills. In Northfield, temporarily protected Town-owned properties include land around town buildings such as the Northfield Elementary School, as well as properties acquired as tax takings.

The Chapter 61, 61A and 61B lands are also considered to have a temporary level of protection from development. The Chapter 61 programs offer a reduced tax assessment on privately owned working land. Landowners that choose to participate in this program therefore receive a reduction in property taxes on the portion of their land that is in active production as agriculture or forestland, or available for public recreation. There are three Chapter 61 programs: Chapter 61 for Forestry, Chapter 61A for Agriculture, and Chapter 61B for Recreation.

In order to participate in the Ch. 61 Program, landowners must manage their forestland under a ten-year management plan. The aim of this program is to temporarily keep working forests undeveloped.

In order to participate in the Chapter 61A program, a landowner must have at least 5 acres of land currently in active agriculture, and apply every year to enroll their parcels of land in the program. The aim of this program is to temporarily keep farmland in active agricultural production.

The 61B program also promotes the private ownership of open space, with the requirement that land enrolled in the program be used for public and private recreation purposes, or as open space. No management plan is required, but the tax savings are smaller. Commercial timber harvesting is not allowed on lands in the Ch. 61B program.

Lands in the Chapter 61 program are considered to be only temporarily protected because a landowner may remove land that is enrolled in the Ch. 61 Program at any time by paying a penalty tax. If the landowner receives a formal offer from another party to purchase a parcel of land that is currently in one of the Ch. 61 Programs (61, 61A, 61B), the landowner must notify the town. The Town then has 120 days to exercise its right of first

refusal by matching the bona-fide offer, or to transfer this right to a conservation organization.

The ability to transfer the right of first refusal to a conservation organization enables the town to create more protected open space without being burdened by the relatively short time frame for action. Private conservation land trusts often have the ability to produce creative and successful fundraising campaigns in short periods of time, while DCR and the Massachusetts Division of Fisheries and Wildlife (MassWildlife) may be interested in purchasing the land in the near future. While it may be difficult to bring a decision on a land purchase to a Special Town Meeting within 120 days, the negotiating process between a land trust, a state conservation agency, and a landowner can be often completed in a shorter period of time. It is therefore helpful for town officials and/or committees to maintain established relationships with conservation organizations such as DCR, MassWildlife, New England Forestry Foundation (NEFF), and local land trusts such as the Mount Grace Land Conservation Trust.

B. PRIVATELY OWNED PARCELS

Approximately 7,627.67 acres, or 34 percent of Northfield's 22,616.71 total acres is privately owned protected open space. Private owners can also include non-profits, most of whom allow public access to their properties. Most of this land is either forested or in use for agriculture. There are many benefits to private ownership of open space (in which non-profits are not the owner). Privately owned open space contributes to the Town's tax base. When used for farming or forestry, land also generates revenue, jobs, food, and forest products. Some landowners allow access to their property for recreational purposes. Most take pride in their land, which favors good stewardship. Finally, owning land gives people a sense of place. This is particularly true of residents whose families have owned land in Northfield for generations. Land ownership encourages a sense of community and helps contribute to community stability over time. Privately owned land provides many public benefits, but it is important to respect private property rights and to remember that landowners ultimately determine use and disposition of this land.

The major disadvantage of private ownership of open space is that most privately owned land can easily be converted to other uses. Only about 16 percent of privately owned open space in Northfield has been permanently protected through APR or CR. The remaining privately owned lands are only temporarily protected, and are therefore vulnerable to development. Some landowners acquire land specifically for the purposes of development, but others are forced to sell property due to circumstances beyond their control. Aging, the death of a parent or spouse, financial needs of family and rising costs or declining profits of farming and forestry are common reasons why landowners decide to put their property on the market. The high value of land for residential development is both a powerful incentive to sell property, and a formidable obstacle to people who might otherwise want to buy it for agriculture or forestry. They are discussed in this Open Space and Recreation Plan because privately owned open space may contain important wildlife habitat, offer unique recreational opportunities, or provide a potential connection between other permanently protected parcels. In some cases, parcels may be deemed valuable enough by the

community to consider purchasing, if available for sale, or helping to protect through conservation easements or other options.

The following tables show temporarily protected, privately owned agricultural and forest land in Northfield identified by assessors' map and lot numbers. Some of this privately owned land is in pasture, cultivated crops, and forest. These open space parcels are still on the tax rolls, whether the land is permanently protected or not. Many landowners have taken advantage of the Chapter 61 programs as evidenced by the fact that there are 6,179.51 acres of open space (27 percent of the total land area) in the 61A, 61B and 61 Programs combined.

In the following tables, Privately Owned Agricultural, Recreational, and Forest Lands are listed by level of protection from development. The ownership of the land is provided with the associated assessors map-lot number and acreage. The current use is based on the vegetation. Farmland may be pasture in Northfield, while forest is presumed to be used as such, whether it is managed for timber or not. Public access on private land may not be permitted, and if it is, is subject to change. State conservation agencies often require some level of public access before paying for, or accepting conservation restrictions. Public access is not a requirement for enrollment in any of the Ch.61 programs including the Ch.61B Recreation Program. It is assumed that given the nature of these open space parcels, access to them by people with disabilities is also not guaranteed.

Important characteristics that could motivate the Town to consider acting on their right of first refusal for a Ch.61 parcel, or negotiating with a willing landowner for a fair purchase price, may include the presence of prime farmland soils, pasture, wetlands, a portion of the land that is above an aquifer, or rare or endangered species habitat. In addition, the parcel may be deemed very important as a link in a potential greenway or trail network, or as a component of a large block of contiguous forest.

B.1 Privately Owned Agricultural Land

According to the Northfield Assessor's records, 438.03 acres of agricultural land, or about 2 percent, of total land area in town is permanently protected under APR (Table 5-2), while 2,453.18 acres of land, or almost 11 percent, of total land area in town is temporarily protected by being enrolled in the Chapter 61A program (Table 5-3). The zoning of the majority of parcels enrolled in Chapter 61A is Rural-Agricultural, remaining parcels fall in the Recreation Tourism District (Area 2).

Table 5-2: Permanently Protected by Agricultural Preservation Restriction

Owner/Manager	Location	Map-Lot	Acres	Important Characteristics
Moose Plain Realty	Mt. Hermon Station Rd.	11 A7	14.6	Prime farmland soils
	Mt. Hermon Station Rd.	11 B1.1	53.2	Prime farmland soils
	River Rd.	11 B3	28.0	Prime farmland soils

	Mt. Hermon Station Rd.	12 A8	16.4	Prime farmland soils
	River Rd.	16 B1	29.0	Prime farmland soils
	River Rd.	16 B2	12.0	Prime farmland soils
Tefft, Donald & Cheryl L.	Mt. Hermon Station Rd.	16 A8	4.28	Prime farmland soils
Split River Farm	Pine Meadow Rd.	73 B2	56.40	Prime farmland soils
	Millers Falls Rd.	73 C2	4.5	Prime farmland soils
	Millers Falls Rd.	73 C5	0.327	Prime farmland soils
	Millers Falls Rd.	73 A2.1	0.131	Prime farmland soils
Smiarowski Farm, Teddy	Millers Falls Rd.	73 C4	12.8	Prime farmland soils
Dunklee, Jeffrey	Caldwell Rd.	11 C1.2	12.1	Unknown
Nourse Realty LLC	Caldwell Rd.	11 C4	17.58	Prime farmland soils
	Caldwell Rd	11 C5	5.75	Prime farmland soils
	Caldwell Rd	11 E4	8.80	Prime farmland soils
	Caldwell Rd.	16 B3	1.00	Prime farmland soils
	Caldwell Rd.	16 B4	18 less 2.25 non-productive	Prime farmland soils
	Caldwell Rd.	16 B5.1	39 less 6.25 listed as 16 A 5	Prime farmland soils
	Caldwell Rd.	16 C2	30	Prime farmland soils
	Caldwell Rd.	24 A1	11	Prime farmland soils
	Caldwell Rd.	24 A2	23.08	Prime farmland soils
	Caldwell Rd.	24 A4	12	Prime farmland soils
Madiedo, Jose A	Maple St.	31 A10	20.58	Prime farmland soils
	Maple St.	31 B6	7.5	Prime farmland soils
		TOTAL	**438.03**	

Source: Town of Northfield Assessor's Records, 2020

Table 5-3: Privately Owned Agricultural Land with Limited Protection From Development in Northfield

Location	Chapter Program	Map-Lot	Acres
Tobacco/Sod			

PINE MEADOW RD	61A	55 B1 1	48.00
Truck Crops - Vegetables			
MT HERMON STATION RD	61A	11 B1.1 1	53.20
RIVER RD	61A	11 B3 1	28.00
CALDWELL RD	61A	11 C4 1	3.30
CALDWELL RD	61A	11 C5 1	4.00
CALDWELL RD	61A	11 E4 1	3.00
MT HERMON STATION RD	61A	16 A9.2 1	4.11
RIVER RD	61A	16 B1 1	29.00
CALDWELL RD	61A	16 B4 1	12.00
CALDWELL RD	61A	16 B5.1 1	23.00
CALDWELL RD	61A	16 C2 1	30.00
REAR MEADOW RD	61A	16 D2 1	15.44
GREAT MEADOW RD	61A	16 D4 1	22.72
GREAT MEADOW RD	61A	16 D5 1	7.00
CALDWELL RD	61A	24 A2 1	17.08
MEADOW ST	61A	24 B1 1	12.60
MEADOW ST	61A	24 B10 1	3.75
MEADOW ST	61A	24 B11 1	4.00
MEADOW ST	61A	24 B12 1	4.10
MEADOW ST	61A	24 B13 1	26.50
MEADOW ST	61A	24 B2 1	11.00
MEADOW ST	61A	24 B3 1	3.00
MEADOW ST	61A	24 B4 1	4.68
MEADOW ST	61A	24 B5 1	8.60
MEADOW ST	61A	24 B6 1	5.00
MEADOW ST	61A	24 B7 1	4.80
MEADOW ST	61A	24 B8 1	8.75
MEADOW ST	61A	24 B9 1	3.50
MEADOW ST	61A	24 C1 1	13.00
GREAT MEADOW RD	61A	24 D6 1	3.00
GREAT MEADOW RD	61A	30 A1 1	5.00
GREAT MEADOW RD	61A	30 A2 1	4.40
GREAT MEADOW RD	61A	30 A3 1	2.98
GREAT MEADOW RD	61A	30 A4 1	14.00
SAGE HOLLOW RD	61A	30 A5 1	8.50
SAGE HOLLOW RD	61A	30 A6 1	2.94
SAGE HOLLOW RD	61A	30 A7 1	5.90
ROUTE 10	61A	30 B2 1	7.50
ROUTE 10	61A	30 B4 1	0.18
ROUTE 10	61A	30 B5 1	1.90
ROUTE 10	61A	30 B6 1	0.20
SAGE HOLLOW RD	61A	30 C1 1	1.34
SAGE HOLLOW RD	61A	30 C2 1	1.56
GREAT MEADOW RD	61A	30 C3 1	4.20

GREAT MEADOW RD	61A	30 C7 1	2.50
GREAT MEADOW RD	61A	30 E1 1	2.90
GREAT MEADOW RD	61A	30 E4 1	0.97
67 ROUTE 10 WEST RD	61A	30 E5 1	1.23
ROUTE 10	61A	30 J1 1	16.20
ROUTE 10	61A	30 J2 1	25.80
CAPT BEERS PLAIN RD	61A	38 B22 1	25.00
ROUTE 10	61A	39 B2 1	23.00
REAR MILLERS FALLS RD	61A	39 B3 1	8.00
REAR MILLERS FALLS RD	61A	39 B6 1	15.00
PINE MEADOW RD	61A	53 E1 1	39.20
PINE MEADOW RD	61A	54 A14.1 1	22.00
PINE MEADOW RD	61A	54 B3 1	17.00
PINE MEADOW RD	61A	54 B4 1	7.00
PINE MEADOW RD	61A	54 B5 1	5.60
PINE MEADOW RD	61A	54 B7 1	6.50
PINE MEADOW RD	61A	73 A2.1 1	0.13
PINE MEADOW RD	61A	73 B2 1	19.00
MILLERS FALLS RD	61A	73 C2 1	4.00
MILLERS FALLS RD	61A	73 C4 1	9.00
MILLERS FALLS RD	61A	73 C5 1	0.33
Field Crops, Hay, Wheat, Tillable Forage Crops, etc.			
MT HERMON STATION RD	61A	11 A7 1	14.58
CALDWELL RD	61A	11 C1.2 1	10.00
65 W NORTHFIELD RD	61A	11 D2 1	10.37
MT HERMON STATION RD	61A	12 A8 1	16.43
504 MT HERMON STATION RD	61A	15 A1 1	4.15
MT HERMON STATION RD	61A	16 A8 1	4.28
RIVER RD	61A	16 B2 1	12.00
MILL ST	61A	17 A23 1	15.50
WARWICK RD	61A	23 D8 1	2.50
REAR PARKER AV	61A	24A A13 1	4.00
REAR MAIN ST	61A	24A A16 1	4.50
REAR PARKER AV	61A	24A A19 1	2.00
REAR ROUTE 10	61A	30 B1 1	5.00
GREAT MEADOW RD	61A	30 C5 1	7.28
GREAT MEADOW RD	61A	30 D1 1	1.50
67 ROUTE 10 WEST RD	61A	30 E5 1	14.51
166 MAPLE ST	61A	31 A10 1	14.00
MAPLE ST	61A	31 B8 1	3.00
15 MAIN ST	61A	38 A40 1	2.00
45 MAPLE ST	61A	38 A6 1	1.50
UPPER FARMS RD	61A	39 B10 1	50.00
REAR UPPER FARMS RD	61A	39 B11 1	27.00
REAR MILLERS FALLS RD	61A	39 B7 1	11.02

GERRISH RD	61A	4 D2 1	5.39
UPPER FARMS RD	61A	41 A1 1	44.00
76 UPPER FARMS RD	61A	41 A3 1	25.00
REAR UPPER FARMS RD	61A	41 A5 1	11.50
REAR UPPER FARMS RD	61A	41 A6 1	8.00
MILLERS FALLS RD	61A	41 D1 1	6.00
CAPT BEERS PLAIN RD	61A	42 A21 1	4.66
CAPT BEERS PLAIN RD	61A	42 A25 1	5.00
SO MOUNTAIN RD	61A	51 A6 1	12.00
MUNNS FERRY RD	61A	52 A5 1	5.71
MILLERS FALLS RD	61A	52 C1 1	7.00
PINE MEADOW RD	61A	53 D1 1	12.00
MILLERS FALLS RD	61A	53 D10 1	15.50
PINE MEADOW RD	61A	55 A4 1	7.30
PINE MEADOW RD	61A	55 A5 1	9.00
PINE MEADOW RD	61A	55 A7 1	5.00
PINE MEADOW RD	61A	55 B2.1 1	3.75
PINE MEADOW RD	61A	55 C1 1	3.00
SO MOUNTAIN RD	61A	57 B7 1	25.00
SO MOUNTAIN RD	61A	58 A5 1	41.30
274 SO MOUNTAIN RD	61A	60 A1 1	8.00
GULF RD	61A	61 B2 1	9.23
OLD WENDELL RD	61A	66 A1.4 1	14.50
OLD WENDELL RD	61A	66 B1 1	20.00
PINE MEADOW RD	61A	72 A1 1	4.00
Orchards – Pears, apples, grapes, etc.			
PINE MEADOW RD	61A	54 A14.1 1	10.00
496 PINE MEADOW RD	61A	55 A1 1	6.58
Productive Woodland			
504 MT HERMON STATION RD	61A	15 A1 1	24.88
REAR PRATT HOLLOW RD	61A	33 A10 1	7.00
PRATT HOLLOW RD	61A	33 A2 1	20.00
STRATTON MTN	61A	33 A5 1	79.00
PRATT HOLLOW RD	61A	33 A8 1	17.00
REAR PRATT HOLLOW RD	61A	33 A9 1	12.00
CAPT BEERS PLAIN RD	61A	38 B22.1 1	5.00
LYMAN RD	61A	42 A16 1	8.50
66 SLATE RD	61A	42 A17 1	25.00
REAR LYMAN RD	61A	42 A18 1	12.80
LYMAN RD	61A	42 A19 1	11.00
REAR CAPT BEERS PLAIN RD	61A	42 A20 1	15.00
CAPT BEERS PLAIN RD	61A	42 A25 1	9.00
FOUR MILE BRK RD	61A	67 A9 1	21.00
FOUR MILE BRK RD	61A	69 B1 1	2.01
MILL ST	61A	17 A23 1	8.48

MILL ST	61A	17 A26 1	0.59
331 WARWICK RD	61A	21 A2 1	73.93
MAPLE ST	61A	31 B8 1	25.00
OLD WENDELL RD	61A	43 A11 1	65.00
MILLERS FALLS RD	61A	43 A7.1 1	100.00
OLD WENDELL RD	61A	51 A1 1	24.00
PINE MEADOW RD	61A	53 D1 1	5.51
SO MOUNTAIN RD	61A	57 B6 1	12.50
SO MOUNTAIN RD	61A	57 B7 1	2.00
LYMAN HILL RD	61A	58 A1 1	29.00
274 SO MOUNTAIN RD	61A	60 A1 1	75.00
Pasture			
WARWICK RD	61A	23 D8 1	8.00
MAPLE ST	61A	31 A15 1	4.02
5 EAST ST	61A	31 A17 1	19.00
224 MAPLE ST	61A	31 B11 1	8.99
15 MAIN ST	61A	38 A40 1	5.95
REAR CAPT BEERS PLAIN RD	61A	42 A27 1	11.00
PINE MEADOW RD	61A	53 E1 1	2.00
PINE MEADOW RD	61A	54 A14.1 1	55.50
PINE MEADOW RD	61A	54 A16 1	2.51
PINE MEADOW RD	61A	54 B5 1	0.90
PINE MEADOW RD	61A	54 B6 1	2.50
PINE MEADOW RD	61A	55 B1 1	13.00
PINE MEADOW RD	61A	55 C1 1	2.00
383 PINE MEADOW RD	61A	55 C2 1	2.27
436 MILLERS FALLS RD	61A	55 D2 1	12.50
MILLERS FALLS RD	61A	55 D4 1	2.60
GULF RD	61A	61 B2 1	4.00
PINE MEADOW RD	61A	72 A1 1	3.00
PINE MEADOW RD	61A	73 B2 1	6.00
Nurseries			
SAGE HOLLOW RD	61A	30 A8 1	5.00
SAGE HOLLOW RD	61A	30 A9 1	7.90
GREAT MEADOW RD	61A	30 C6 1	1.00
Contiguous Non-productive			
CALDWELL RD	61A	11 C1.2 1	2.10
CALDWELL RD	61A	11 C4 1	14.28
CALDWELL RD	61A	11 C5 1	1.75
CALDWELL RD	61A	11 E5 1	8.80
REAR OLD VERNON RD	61A	13 A5 1	9.22
CALDWELL RD	61A	16 B3 1	1.00
CALDWELL RD	61A	16 B4 1	6.00
92 CALDWELL RD	61A	16 B5 1	5.11
CALDWELL RD	61A	16 B5.1 1	10.00

CALDWELL RD	61A	24 A1 1	11.00
CALDWELL RD	61A	24 A2 1	6.00
REAR CALDWELL RD	61A	24 A4 1	12.00
166 MAPLE ST	61A	31 A10 1	4.48
224 MAPLE ST	61A	31 B11 1	1.00
MAPLE ST	61A	38 B6 1	7.50
76 UPPER FARMS RD	61A	41 A3 1	4.00
REAR UPPER FARMS RD	61A	41 A6 1	7.00
MILLERS FALLS RD	61A	43 A7.1 1	82.50
MILLERS FALLS RD	61A	52 C1 1	7.03
MILLERS FALLS RD	61A	53 D10 1	3.72
PINE MEADOW RD	61A	53 E1 1	2.80
PINE MEADOW RD	61A	54 B6 1	3.66
PINE MEADOW RD	61A	54 B7 1	0.50
PINE MEADOW RD	61A	55 B1 1	12.60
PINE MEADOW RD	61A	55 B2.1 1	1.50
PINE MEADOW RD	61A	55 C1 1	6.00
383 PINE MEADOW RD	61A	55 C2 1	2.00
436 MILLERS FALLS RD	61A	55 D2 1	7.50
MILLERS FALLS RD	61A	55 D4 1	6.40
PINE MEADOW RD	61A	72 A1 1	6.00
PINE MEADOW RD	61A	72 B1 1	1.95
PINE MEADOW RD	61A	73 B2 1	31.40
MILLERS FALLS RD	61A	73 C2 1	0.06
MILLERS FALLS RD	61A	73 C4 1	3.85
	Total	**2,453.18**	

Source: Town of Northfield Assessors Records; June 2020.

In some cases, farmland enrolled in Chapter 61A abuts protected land. Conversion of even a small percentage of this farmland to residential use could affect the viability of farming on the remaining farmland. Location of new homes in proximity to active agricultural operations may result in conflict between new residents and farmers over the noise, dust, odors, and use of chemicals that are part of normal agricultural practices. Increased commuter traffic on roads in agricultural areas also makes it difficult for farmers to move their equipment between fields. Northfield's Agricultural Commission was instrumental in helping the Town adopt a Right to Farm Bylaw to address this issue. The bylaw notifies new and existing residents that the community supports agriculture and the inherent activities associated with farming.

Much of the land enrolled in Chapter 61A also abuts rivers and streams. While agriculture can have negative impacts on water quality, these impacts can be reduced or avoided through the use of best management practices. When best management practices are observed, agriculture is compatible with watershed protection because it keeps the land open, while development results in conversion of land to impervious surfaces with negative impacts on water quality.

Agricultural lands enrolled in the Chapter 61A program continue to be used as farmland and all lie within the Town's Residential-Agricultural or Recreational Tourism Districts. No state, town, or private funds are necessary to enroll the land in the program. Chapter 61A lands offer much value to the town, even if the farmlands are only "temporarily protected." The agricultural parcels often contain prime farmland soils, contribute to the town's tax base and generate revenue, employment, and food products. In addition, some landowners may allow access to their property for recreational purposes, such as hiking, nature study, or hunting. However, access should not be assumed, as the land is privately owned. Most Chapter 61A landowners take pride in their land, while practicing good stewardship. They help to define a sense of place for Northfield and contribute to community stability over time.

Remaining farms that are not in either the APR Program or the Chapter 61 Program are not listed here, as they are not considered to have any form of protection from development. It is important to note that farms may remain in a family for generations with no formal protection other than a family's desire and ability to keep working the land. However, with development pressure and unreliable economic and weather conditions that impact farms, it is important for farm families to consider successional planning for the future continuance of their farm. This future planning may involve family discussions to consider land protection options, legal and estate issues, ownership and management of the farm operation, and sharing of assets among successors.

B.2 Privately Owned Forested Land

Some of the largest tracts of unbroken forest land in Northfield are privately owned. Large blocks of contiguous forest support and sustain woodland species with specialized habitats that can be irreparably lost once a forest is fragmented by roads and development.

Mill Brook *(Jerry Wagener)*

The following two tables list privately owned forestland with different levels of protection from development. Permanently protected forestland exists when landowners have donated or sold their development rights to a state conservation organization or a land trust. The landowners retain the other rights of ownership and they continue to pay property taxes, though these taxes are lower due to the reduced value of their land. Properties with conservation restrictions may have the potential for passive recreational use or for activities such as fishing or hunting, but this is dependent upon the wishes of the landowner. It is important to note, however, that public access cannot be assumed, as properties with conservation restrictions are privately owned. Northfield currently has 21 privately owned properties that are permanently protected from development with a conservation restriction (see Table 5-4).

Table 5-4: Forestlands with Permanent Protection from Development

Owner	Conservation Restriction	Map/Lot	Acres
FRENCH RICHARD C	CR	52 A5 1	5.71
FRENCH RICHARD C	CR	52 C1 1	14.03
AMES WILLIAM S	CR	44 A5.5 1	8.63
AMES WILLIAM S	CR	51 A8 1	147.32
RICHARDSON SAMUEL A LIFE ESTA	CR	35 A2 1	9.75
RICHARDSON SAMUEL A LIFE ESTA	CR	35 A7 1	17.00
RICHARDSON SAMUEL A LIFE ESTA	CR	35 A8 1	11.00
COPELAND H WILLIAM	CR	2 B4.1 1	76.56
COPELAND H WILLIAM	CR	3 A2 1	17.46
COPELAND H WILLIAM	CR	3 A4 1	79.00
HATTON DAVID	CR	13 A12 1	50.00
HATTON DAVID	CR	13 A6 1	9.00
HATTON DAVID	CR	13 A7 1	1.50
HATTON DAVID	CR	13 A8 1	24.20
HATTON DAVID	CR	13 A9 1	33.00
HATTON DAVID	CR	13 A9.1 1	7.00
NORTHFIELD MT HERMON SCHOOL	CR	19 A5 1	0.86
NORTHFIELD MT HERMON SCHOOL	CR	19 B7 1	13.00
JAWORSKI WALTER C	CR	66 A1.4 1	139.66
FIRSTLIGHT HYDRO GENERATING CO	CR	66 A5.1 1	10.10
JAWORSKI WALTER C	CR	66 B1 1	92.12
		TOTAL	**766.90**

Source: Town of Northfield Assessors Records; June 2020.

Land that is considered temporarily protected from development includes those lands enrolled in the Ch.61 Programs. Shown in Table 5-5 is 3,726.53 acres of privately owned forest and recreation land, approximately 16.5 percent of the town, with temporary protection in Northfield. 2,765.96 acres, or 12 percent of the town is privately owned forest that is enrolled in the Chapter 61 (Forestry) program while approximately 960.6 acres or 4 percent of the town is enrolled in the Chapter 61B (Recreation) program. Many of the temporarily protected farms shown in Table 5-5 include farm woodlots.

All of the parcels in Table 5-5 are temporarily protected in the Ch. 61B Recreational Open Space and the Ch. 61 Forestland Classification and Taxation Program, and the degree of protection of these parcels is short term. The owner noted is also the manager of the parcel. There are no public grants awarded as a result of the Program; however, the owner does receive a property tax break over a ten-year period. Most of Northfield is zoned Residential-Agricultural (RA) or Residential-Agricultural-Forested (RAF). There are a number of sub-districts recently developed, including a Planned Development District (PD) at the north end of Main Street, a Village Center District (VC) and Recreational Tourism District (RT) are along Main Street, and a second Recreational Tourism District area in the southern-most portion of town on Route 63.

Table 5-5: Forestlands with Temporary Protection from Development Enrolled in the Ch.61 B Recreational Open Space and Ch. 61 Forestland Taxation Program

Location	Chapter Program	Map-Lot	Acres
Ch.61 Forest – West side of Connecticut River			
WEST RD	61	12 A3 1	22.40
OLD VERNON RD	61	13 A12 1	50.00
OLD VERNON RD	61	13 A6 1	9.00
OLD VERNON RD	61	13 A7 1	0.50
OLD VERNON RD	61	13 A8 1	24.20
OLD VERNON RD	61	13 A9 1	30.00
OLD VERNON RD	61	13 A9.1 1	7.00
WEST ROAD	61	15 A1.1 1	59.15
OLD VERNON RD	61	26 A13 1	10.00
OLD VERNON RD	61	26 A15 1	10.86
OLD VERNON RD	61	26 A4 1	28.00
OLD VERNON RD	61	26 A5 1	14.50
OLD VERNON RD	61	26 A6 1	1.00
OLD VERNON RD	61	26 A7 1	17.90
MT HERMON STATION RD	61	27 A12 1	5.00
MT HERMON STATION RD	61	27 A4.2 1	15.00
MT HERMON STATION RD	61	27 A4.3 1	5.57
MT HERMON STATION RD	61	27 A5 1	5.00
MT HERMON STATION RD	61	27 A6 1	43.83
Ch.61 Forest – East side of Connecticut River			
WARWICK RD	61	18 D2 1	29.00
WARWICK RD	61	19 A4 1	0.12
WARWICK RD	61	19 A5 1	0.86
WARWICK RD	61	19 B7 1	13.00
WARWICK RD	61	21 A4 1	98.00
263 C WARWICK RD	61	22 C2.1 1	16.90
WARWICK RD	61	22 C2.2 1	22.00
OLD VERNON RD	61	26 A6 1	17.00
ALEXANDER HILL RD	61	32 B3 1	13.85
ALEXANDER HILL RD	61	33 A4 1	13.80
ALEXANDER HILL RD	61	33 A4.1 1	3.25
PRATT HOLLOW RD	61	33 A7 1	8.00
PRATT HOLLOW RD	61	33 A7.1 1	8.00
242 ALEXANDER HILL RD	61	34 A1 1	91.00
ALEXANDER HILL RD	61	34 B1 1	26.00
ALEXANDER HILL RD	61	34 B2 1	6.75
WARWICK RD	61	35 A11 1	80.00

STRATTON MTN	61	35 A2 1	9.75
STRATTON MTN	61	35 A7 1	16.75
STRATTON MTN	61	35 A8 1	11.00
GULF RD	61	36 A2 1	163.00
GULF RD	61	37 A4 1	24.00
GULF RD	61	37 A6 1	55.00
177 GULF RD	61	37 A8 1	35.80
256 CAPT BEERS PLAIN RD	61	38 A14 1	18.40
CAPT BEERS PLAIN RD	61	38 A14.1 1	1.30
OLD WENDELL RD	61	45 A2 1	48.00
OLD WENDELL RD	61	45 A8 1	27.65
ORANGE RD	61	46 A2 1	20.00
113 COLLER CEMETERY RD	61	48 A5 1	34.50
50 SO MOUNTAIN RD	61	51 A8 1	126.70
458 MILLERS FALLS RD	61	56 A3 1	15.40
REAR MILLERS FALLS RD	61	56 B8 1	18.00
MILLERS FALLS RD	61	56 B8.1 1	31.62
MILLERS FALLS RD	61	56 B9 1	24.00
35 FISHER RD	61	58 A2.1 1	64.24
FISHER RD	61	58 A2.2 1	49.81
SO MOUNTAIN RD	61	59 B4 1	0.25
WINCHESTER RD	61	6 A28 1	10.00
WINCHESTER RD	61	6 C1 1	7.14
LOUISIANA RD	61	6 C17 1	7.00
LOUISIANA RD	61	6 C19 1	15.00
WINCHESTER RD	61	6 C2 1	4.50
126 LOUISIANA RD	61	6 C20 1	54.70
WINCHESTER RD	61	6 C3 1	6.75
WINCHESTER RD	61	6 C5 1	5.50
225 WINCHESTER RD	61	6 C6 1	1.86
LOUISIANA RD	61	6 D2 1	0.47
89 LOUISIANA RD	61	6 D4 1	6.00
LOUISIANA RD	61	6 D6 1	9.00
LOUISIANA RD	61	6 D7 1	19.00
675 GULF RD	61	61 A4 1	31.08
GULF RD	61	61 B2 1	67.17
SWAMP RD	61	62 A2 1	103.00
GULF RD	61	65 B1 1	13.90
GULF RD	61	65 B1.2 1	6.60
GULF RD	61	65 B2 1	7.60
746 GULF RD	61	65 B3 1	23.76
OLD WENDELL RD	61	66 A1.4 1	125.16
OLD WENDELL RD	61	66 A5 1	10.60
OLD WENDELL RD	61	66 B1 1	72.12
FOUR MILE BRK RD	61	68 A1 1	20.00

FOUR MILE BRK RD	61	69 A1 1	17.07
FOUR MILE BRK RD	61	69 A1.3 1	2.00
FOUR MILE BRK RD	61	69 A3 1	20.63
FOUR MILE BRK RD	61	69 A5 1	60.00
FOUR MILE BRK RD	61	69 A6 1	4.40
FOUR MILE BRK RD	61	69 B3 1	35.60
FOUR MILE BRK RD	61	69 B4 1	20.00
173 FOUR MILE BRK RD	61	69 B5 1	18.30
FOUR MILE BRK RD	61	69 B6 1	18.60
REAR LOUISIANA RD	61	7 A1 1	36.70
REAR LOUISIANA RD	61	7 A10 1	28.00
LOUISIANA RD	61	7 A11 1	22.00
LOUISIANA RD	61	7 A2 1	13.00
LOUISIANA RD	61	7 A3 1	12.20
LOUISIANA RD	61	7 A4 1	24.08
LOUISIANA RD	61	7 A7 1	34.14
LOUISIANA RD	61	7 A8 1	15.60
LOUISIANA RD	61	7 A9 1	13.20
MILLERS FALLS RD	61	70 A4 1	4.50
MILLERS FALLS RD	61	70 A7 1	10.00
MILLERS FALLS RD	61	71 A1 1	85.54
FOUR MILE BRK RD	61	71 B1 1	1.10
FOUR MILE BRK RD	61	71 B2.2 1	24.98
226 MILLERS FALLS RD	61	72 C8 1	14.80
		Ch.61 **Total**	**2765.96**
Recreational Hiking			
BIRNAM RD	61B	23 C1 1	30.00
620 MT HERMON STATION RD	61B	3 A11 1	13.00
STRATTON MTN	61B	35 A3 1	10.00
MILLERS FALLS RD	61B	52 E5 1	5.08
MILLERS FALLS RD	61B	55 D5 1	38.00
261 OLD WENDELL RD	61B	61 A13 1	10.00
ORANGE RD	61B	64 B1 1	3.80
486 ORANGE RD	61B	64 C1 1	0.35
SO MOUNTAIN RD	61B	65 D3.1	43.00
OLD WENDELL RD	61B	66 A5.1 1	10.10
304 FOUR MILE BRK RD	61B	67 A10 1	27.00
MILLERS FALLS RD	61B	70 A14 1	43.84
11 FERNCLIFF CR	61B	9A R1 1	8.48
Recreational Land Nature Study/Observation			
179 WEST RD	61B	2 B5 1	180.10
STRATTON MTN	61B	35 A1 1	15.67
GULF RD	61B	36 A3 1	101.00
ORANGE RD	61B	49 B3.4 1	6.68
67 SO MOUNTAIN RD	61B	52 D16 1	8.00

496 MILLERS FALLS RD	61B	56 A1.1 1	25.00
SO MOUNTAIN RD	61B	60 A2 1	64.00
REAR OLD WENDELL RD	61B	60 A6 1	43.00
30 MURDOCK HILL RD	61B	65 B5 1	66.20
52 MURDOCK HILL RD	61B	65 B8 1	20.00
MURDOCK HILL RD	61B	65 C2 1	2.75
FOUR MILE BRK RD	61B	67 A3 1	30.00
364 FOUR MILE BRK RD	61B	67 A7 1	35.34
Recreational Golf Course			
HIGHLAND AV	61B	17 D2 1	39.00
31 HOLTON ST	61B	17 D5 1	50.00
Recreational Horseback Riding			
848 OLD WENDELL RD	61B	38 B10 1	12.50
NEW PLAIN RD	61B	38 B11 1	2.00
OLD WENDELL RD	61B	38 B7 1	10.86
REAR OLD WENDELL RD	61B	38 B9.4 1	4.94
850 OLD WENDELL RD	61B	38 B9.5 1	0.91
		Ch.61B **Total**	**960.6**
	Total	**3,726.53**	

Source: Town of Northfield Assessors Records; June 2020.

Table 5-6: Land with Limited Protection from Development owned by the Northfield Mount Hermon School and Leased to the East Northfield Water Co.

Owner/ Property Manager	Site Name	Map / Lot	Acres
NMH/East Northfield Water Co.	East Northfield Water Co.	6 C19, C20	58.0
NMH/East Northfield Water Co.	East Northfield Water Co.	7 A1, A2, A3, A4, A7, A8, A9, A10, A11	185.0
		TOTAL	**243.0**

Source: Town of Northfield Assessor's Records and Maps, 2020.

B.3 Significant Private Land Holdings with Protection in Northfield

Privately owned forestlands offer many values to the community and are important resources for several reasons. Many forestlands are large parcels with a low degree of fragmentation, so wildlife and plant habitats are preserved. When these forestlands are protected from development, they help to protect and provide clean water, air, and healthy wildlife populations. Forest soils have a high infiltration capacity, so they absorb moisture and permit very little surface runoff. Once absorbed, water is released gradually so flooding is reduced during large rain events and streamflow is maintained during low water months. Forests recycle nutrients, so the nutrients do not pass into waterways, and water quality is preserved. Because forest soils are absorptive, soil erosion is reduced and fish habitat is preserved. Forestlands also have a thermal impact on brooks. When trees are removed from stream banks, water temperatures rise and cold water-dependent aquatic species like trout are adversely affected. Many forested lands may also provide recreational value such as hunting, fishing, hiking, and bird watching for Northfield residents, if the owner allows access.

C. PUBLIC PARCELS

State conservation agencies and the Town of Northfield own a small portion of Northfield's land. However, the Town-owned parcels have a low level of protection unless they are under the authority of the Northfield Conservation Commission. The following inventories include those parcels that are owned by the Commonwealth of Massachusetts and by the Town of Northfield.

C.1 Publicly Owned Open Space

There are approximately 4,593.88 acres of publicly owned open space in Northfield, accounting for 37.5 percent of total open space in Northfield and about 20 percent of the Town's land area. Publicly owned open space includes land owned by state conservation agencies, municipal fire and water districts, school districts, the federal government and the Town of Northfield. These lands are inventoried in the remaining tables in this section. For the purposes of this section, both public and privately owned cemeteries are included in this category. Cemeteries are listed in Table 5-10.

The Massachusetts Department of Conservation and Recreation (DCR) owns the Northfield State Forest, which totals 3,139.06 acres, and Pine Meadow Road, 32 acres, listed in Table 5-7. The Northfield State Forest is located in the east side of town, and contains hiking and cross-country skiing trails. It is part of the much larger state forest which extends across the town line into Warwick. Northfield State Forest now consists of 3 parcels owned by the Commonwealth; nearly 1,300 acres were added to the State Forest in 2016 after DCR and the Trust for Public Land secured protection of most of a 1,600-acre forest formerly belonging to Northfield Mount Hermon's Northfield campus. Satan's Kingdom Wildlife Management area, owned by the Division of Fisheries and Wildlife (MassWildlife), is approximately 842.59 acres and is located in the northwest corner of Northfield, on the west side of the Connecticut River.

Table 5-7: Permanently Protected State-Owned Land in Northfield

Property Manager	Site name	Map-Lot	Location	Recreation Value	Public Access	Acres
DCR	Northfield State Forest	46 A4 1	GULF RD			117.05
DFW	Pauchaug Meadow	217 104.0 1	HINSDALE RD			161.83
DCR	Northfield State Forest	6 D3 S	LOUISIANA RD			1198.81
DFW	Satan's Kingdom	217 101.0 1	OLD VERNON RD			232.26
DFW	Satan's Kingdom	217 103.2 1	OLD VERNON RD			45.58
DFW	Satan's Kingdom	217 103.3 1	OLD VERNON RD			12.00
DFW	Satan's Kingdom	217 103.4 1	OLD VERNON RD			23.3
DFW	Satan's Kingdom	217 103.5 1	OLD VERNON RD			41.00
DFW	Satan's Kingdom	217 103.6 1	OLD VERNON RD			40.00
DFW	Satan's Kingdom	217 103.7 1	OLD VERNON RD			256.5
DCR	Northfield State Forest	217 102.0 1	ORANGE RD			1823.20
DFW	Satan's Kingdom	217 103.1 1	WEST RD			11.32
DFW	Satan's Kingdom	217 103.8 1	WEST RD			105.00
DFW	Satan's Kingdom	26 A11 1	OLD VERNON RD			7.00

DFW	Satan's Kingdom	217 103.9 1	OLD VERNON RD			16.13
DCR	Pine Meadow Road	73 B6 1	PINE MEADOW RD			32.00
DFW	Satan's Kingdom	2 A2 1	WEST RD			52.50
					TOTAL	**4,175.48**

Source: Town of Northfield Assessor's Records and Maps, 2020

The Town of Northfield owns approximately 428.4 acres of open space (Table 5-8, 5-9, and 5-10). Parcels under the authority of the Select Board are considered to have limited protection from development. If residents wanted to sell Town land for development, the Select Board or a Town Meeting vote could provide the authority. If the land is held by the Conservation Commission, it would take a majority vote by the Massachusetts State Legislature to convert this open space to another non-conservation use. Some of these open spaces are set aside for municipal uses like schools, parks, or historic sites.

It is not unusual for a community to set aside land for future expansion of schools, sports fields, police and fire stations, and drinking water supplies. Open space planned for these purposes might be used as open space today and placed under the authority of the Select Board. It may also be sensible to consider placing Town-owned land that clearly contains wetlands or wildlife habitat under the authority and protection of the Conservation Commission.

New England Trail *(Joanne McGee)*

Significant undeveloped open space owned by the Town includes Northfield Town Forest and the adjacent, Brush Mountain, where the New England Trail passes through (NET, formerly the M&M Trail). Northfield Town Forest comprised approximately 150 acres, and Brush Mountain is about 50 acres, and both offer public access off of Gulf Road.

Table 5-8: Town-Owned Land with Permanent Protection from Development

Owner/ Property Manager	Site Name	Map	Current Use	Condition	Recreation Value	Public Access	Acres	Grant Received	Zoning	Level of Protection
Town of Northfield Conservation Commission	Brush Mt. Conservation Area	50 – A2	Recreation, Historical Site, Wildlife Habitat	Good	***High*** – Hiking, Snowshoeing, X-country Skiing	Yes	46	DCS LAND, Rec Trails grants	RAF	Permanent
Town of Northfield Conservation Commission	Town Forest Brush Mt. [1]	45-A1 1,5	Forest, Sustainable Logging, Wildlife Habitat	Good	***High*** – Hiking, X-country Skiing, Orienteering	Yes	150	Forest Legacy grant	RAF	Permanent
						TOTAL	**196.0**			

Source: Town of Northfield Assessor's Records and Maps, 2020.

[1] Mount Grace Land Conservation Trust played a major role in the conservation of Brush Mt. and the Town Forest.

Table 5-9: Town-Owned Land with Limited Protection from Development

Owner/ Property Manager	Site Name	Map	Current Use	Condition	Recreation Value	Public Access	Acres	Zoning	Level of Protection
Town of Northfield	King Philip's Hill	29-E4	Historical Site and Monument[2]	Good	High – Trails, Picnics	Yes	10.5	RAF	Limited Protection
Town of Northfield	Northfield Elementary School	23 A3	Playground; Playing Fields	Good	High	Yes	10.0	VC	Limited
Town of Northfield	Rear Parker Ave.	24 D9	Open Land	Good	Low	No	0.4	RA	Limited
Town of Northfield	Parker Ave.	24 D3	Open Land	Good	Low	Yes	6.5	RA	Limited
Town of Northfield	Parker Ave.	24 D4	Open Land	Good	Low	Yes	6.0	RA	Limited
Town of Northfield	Great Meadow Rd.	24 D5	Open Land	Good	Low	Yes	0.5	RA	Limited
Town of Northfield	off Old Bernardston Rd.	29 B7	Old Road Bed	Good	Low	Yes	1.7	RA	Limited
Town of Northfield	Gill Center Rd.	40 B1	Open Land	Good	Low	Yes	0.6	RA	Limited
Town of Northfield	Historical Site, Millers Falls Rd.	43 A5	Historical Site and Monument	Good	High	Yes	0.7	RA	Limited
Town of Northfield	Corner of Cross Rd. and Rte. 63	55 D9	Old Road Bed	Good	Low	Yes	0.4	RA	Limited
								TOTAL	**36.67**

Source: Town of Northfield Assessor's Records and Maps, 2020.

Table 5-9 lists the cemeteries in Northfield, seven of which are owned by the Town of Northfield and one that is owned by the Roman Catholic Society. Cemeteries are considered to be protected from development. Most cemeteries represent well-maintained open space areas that are sometimes appropriate for walking and bird watching.

[2] On December 16, 1981, King Phillips Hill was designated as a Historical site by the State. A state historical marker is there now.

Table 5-10: Town-Owned Land with Permanent Protection – Cemeteries

Owner / Property Manager	Site Name	Map/Lot	Acres
Town of Northfield	West Northfield Cemetery	16 A2	1.7
Town of Northfield	Pentecost Cemetery	17 B 6.1	4.5
Town of Northfield	Center Cemetery	24 C2	8.1
Town of Northfield	Center Cemetery	24 C4	0.7
Roman Catholic Society	St. Mary's Cemetery	31 A9	2.57
Town of Northfield	Mount Hermon Cemetery	40 B24, B25	0.7
Town of Northfield	Coller Cemetery	48 A7	0.3
Town of Northfield	South Mountain Cemetery	65 D1	0.3
Town of Northfield	Northfield Farms Cemetery	74 A3	4.0
		TOTAL	**22.87**

Source: Town of Northfield Assessors Records; June 2020.

Table 5-11 lists parcels owned by the Northfield Water District as drinking water supply land.

Table 5-11: Northfield Water District Land with Limited Protection from Development

Owner/Property Manager/Site Name	Map/Lot	Acres
Northfield Water District	21 A5	153.0
Northfield Water District	22 B9	2.1
Northfield Water District	22 B10	1.3
Northfield Water District	22 C20	17.3
	TOTAL	**173.6**

Source: Northfield Assessor's Records and Maps, 2012; Personal Communication with Steve Malsch, Northfield Water District, 2012.

D. RECREATIONAL RESOURCES AND OPEN SPACE EQUITY

Open Space Equity means taking a look at conservation and recreation opportunities available in the town and seeing if there is an area of the town that seems to be lacking resources. There is a heavier concentration of people around the center of town, but most other residences are spread out along the rural roads in town. There are a host of activities that people do both within town and out of town. The most popular activities according to the Open Space Survey are walking and hiking, swimming, biking, skiing and snowshoeing, boating/kayaking, running, nature observation, birdwatching, and camping. All of these activities can be done throughout Northfield, and there is no area of town that is deprived of recreational opportunities relative to other areas. However, there is a town-wide need for more swimming opportunities, either in the form of a community pool or as improved access to swimming destinations on natural waterbodies and rivers in town.

Many of Northfield's recreational resources are on public land, owned by the Town and the State, including Northfield State Forest, Satan's Kingdom, Northfield Town Forest, Brush Mountain, Northfield Elementary School playground, Bennet Meadow, Pauchag Boat Ramp, West Northfield Playground, Kiwanis Park, and village streets and scenic byways. Privately owned lands town wide, including destinations such as the Mill Brook trails behind the library, the Northfield Golf Club, Northfield Mountain Recreation Area, Alexander Hill Trails, and Alderbrook Meadow Accessible Trail also offer residents access to their favorite outdoor recreation activities.

E. OPPORTUNITIES FOR FUNDING OPEN SPACE AND CONSERVATION PROJECTS IN NORTHFIELD

The opportunities for the Town of Northfield to procure funding for open space projects can be a challenge. The following paragraphs provide a brief description of some of 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%20Report%202019%20-%20FINAL.pdf

Public Conservation Funding in New England: Recent Trends in Government Spending on Land Protection - https://www.wildlandsandwoodlands.org/sites/default/files/Public%20Funding%20LR.pdf

E.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.

Mount Grace Land Conservation Trust serves as the regional land trust for Northfield and towns to the south and east. The organization aims to protect significant agricultural, natural, and scenic lands and encourage land stewardship. Mount Grace also participates in the North Quabbin Regional Landscape Partnership (NQRLP), a voluntary association of public and private groups focused on conserving land and rural lifestyle in Mount Grace's service region. 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.

www.mountgrace.org
https://www.mountgrace.org/initiatives/nqrlp

The Franklin Land Trust (FLT) works with farmers and other landowners to protect their land from unwanted development. The organization works to conserve farms, forests, wildlands, and other natural resources through the values of regional sustainability (through local economy and balanced community growth, land stewardship, community involvement, and support for the goals of landowners. FLT serves landowners in towns in western Franklin and Hampshire counties, protecting land by holding CRs and APRs on private property and purchasing property in fee.
http://www.franklinlandtrust.org/

In addition to FLT, several other regional and statewide conservation organizations have completed conservation projects in Warwick and continue to be available for partnership conservation projects. The New England Forestry Foundation (NEFF) owns Lucky Dog Forest in Buckland (and Conway). NEFF's focus is conserving managed forest lands. Additional organizations include the Trustees of Reservations, Massachusetts Audubon Society, and The Nature Conservancy. Each 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.
https://newenglandforestry.org/

E.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 an up-to-date Open Space and Recreation Plan 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 52-70%, 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%, 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 from the Federal Land and Water Conservation Fund. The program provides up to 50% 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% of the total eligible project cost up to the grant award maximum of $85,000. This is a resource that could be helpful to Northfield because there are so many parcels in Town with high conservation value and only temporary protection status that organizations such as FLT would be interested in working with the Town to conserve. The challenge is finding funds for the remaining 50% 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% 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% 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% 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 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

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 species of greatest conservation need and game species. 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 Vulernability 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 who have received designation as a Climate Change Municipal Vulnerability Preparedness (MVP) Community 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% of total project cost using cash or in-kind contributions.
https://www.mass.gov/service-details/mvp-action-grant

Community Preservation Act
Muncipalities 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

The CPA allows communities to create a local Community Preservation Fund to raise money through a surcharge of up to 3% of the real estate tax levy on real property for open space protection, historic preservation and the provision of affordable housing. The act also creates a state matching fund, which serves as an incentive to communities to pass the CPA. Municipalities must adopt the Act by ballot referendum. Communities can choose to exempt the first $100,000 of taxable residential real estate value, as well as low income households, from the surcharge.

A minimum of 10% of the annual revenues of the fund must be used for each of the three core community concerns, and up to 5% 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. If residents don't feel the CPA is working as they expected, they can repeal it or change the surcharge amount.
https://www.communitypreservation.org/about

SECTION 6

COMMUNITY VISION

A. DESCRIPTION OF PROCESS

The Town of Northfield's open space and recreation goals were developed through the following planning process:

- In 2020, Northfield completed an Open Space and Recreation Plan Update to reflect existing conditions in Northfield and public consensus.

- Beginning in July 2019 to March 2021, the Northfield Open Space Committee and the Franklin Regional Council of Governments Planning Department developed and updated the Open Space and Recreation Plan using several methods for involving public participation:
    - The Open Space and Recreation Survey results were used to support the development of Section 8 Goals and Objectives as well as the overall open space and recreation vision.
    - 21 public meetings were held by the Open Space Planning Committee and were open to the public.
    - Drafts of each section of the plan were sent to the Open Space Planning Committee members representing key town boards and community groups.
    - A public forum was held on February 10, 2021 where residents reviewed and discussed the inventory, analysis, community goals, objectives, and seven-year action plan. All public comments were recorded and incorporated into the plan.

B. STATEMENT OF OPEN SPACE AND RECREATIONAL GOALS

The 2020 Survey results show that Northfield's OSRP goals have changed in specificity, but not in character. People choose to live in Northfield because of its abundant natural resources, rural small town character, variety of outdoor recreation opportunities, and the community's focus and awareness of climate change and sustainability. Residents value the Town's scenic beauty; its fresh water ponds, streams, rivers and wetlands; the large expanses of uninterrupted forest; diverse wildlife; and peace and quiet. The survey results also show that a majority of town residents feel that the history of Northfield is important and worth protecting.

Ideally, a future Northfield will have conserved the majority of its uninterrupted forest and the mosaic of its pastures and active farmland. Water and air quality will be protected and continuously improved where necessary. In addition, the effects of climate

change will inform open space and recreation decisions in town. To help create this vision, the town will work to implement priorities identified in its 2014 Master Plan as well as this Open Space and Recreation Plan. The Town will increase its education and outreach efforts to better inform residents about land use practices and recreational opportunities in town, and apply the latest Massachusetts guidelines on climate change resiliency planning, including priorities from the 2021 Northfield and Warwick Hazard Mitigation & Municipal Vulnerability Regional Plan. These achievements will enhance biodiversity, create more resilient land use and development, and improve both public and private open spaces for the enjoyment of people locally and regionally. Northfield will also have preserved and shared the stories and physical remains of its historic sites.

Recreation pastimes will include both active and passive activities such as hiking, walking/running, nature/birdwatching, boating, and bicycling. These pastimes are made available by the extensive trail systems in town, conserved open space and natural areas, historic resources, safe roads for pedestrians and bicyclists, and other recreational amenities.

Overlook on the Gunnery Sergeant Jeffrey S. Ames Accessible Nature Trail at Alderbrook Meadows Wildlife Sanctuary *(Julia Blyth)*

SECTION 7

ANALYSIS OF NEEDS

The Northfield Open Space and Recreation Plan incorporates the inventory of all the land-based natural, scenic, and cultural resources that are available in town (Section 4), identifies the most important parcels of land that contain these resources (Section 5), and based on the community's general goals (Section 6), makes comparisons between the supply of resources and the demand (Section 7). In the following section, the recreation and open space needs of residents are identified using the 2020 Open Space and Recreation Survey, data from Sections 3, 4, and 5, and committee input. Finally, the obstacles to the effective resolution of these needs are addressed including organizational barriers and the most significant land use conflicts concerning open space and natural resource use.

A. SUMMARY OF NATURAL RESOURCE PROTECTION NEEDS

Northfield residents value their forests, water bodies, and the quality of the air and drinking water in town. According to the 2020 Open Space Survey, 80 percent or more of survey respondents stated that it was important or very important to protect wildlife, streams, ponds, clean drinking water, forests, clean air, scenic views, and farmland.

According to the 2020 Open Space survey results, the open space features considered very important by Northfield respondents are:

1) Air/water quality (91%);
2) Forests (89%);
3) Farms and farmland (83%);
4) Trails (74%);
5) Rural character (73%).

Fortunately, these priorities are highly compatible. The protection of contiguous forestland and land along rivers and streams has the added benefit of also protecting drinking water and wildlife habitat.

Protecting land along water bodies provides multiple benefits. Riparian buffer areas help protect water quality by filtering and slowing stormwater runoff from adjacent land uses and support habitat for species that rely on cool water temperatures. Mitigating the use of road salt in the winters can also help protect water quality. Permanently protected land along water provides public access, depending on whether it is publicly or privately owned, and the details of the restriction on the property.

A total of 74 percent of Northfield's land is forested and provides a rich habitat for wildlife, while helping maintain the Town's clean drinking water. Northfield has a

significant amount of uninterrupted forestland, which is vital to wildlife diversity and resilience to the effects of climate change.

Protecting farmland, forest land, scenic views, and other open space is seen as vital to maintaining the quality of air, water, and wildlife habitats and is the primary Open Space Goal in combination with sustaining the Town's historic rural character. To achieve natural resource protection and conservation, Northfield residents support: acceptance by the town of donated conservation land (82%); conservation by private nonprofits and land trusts (72%); educating residents about land protection opportunities and estate planning (68%); acceptance by the town of donated development rights (conservation restriction) (67%); educating residents and landowners about the public service costs associated with land uses (66%); and encouraging conservation by state agencies (64%).

In order to make progress on natural resource protection and conservation in town, the Northfield Open Space Committee has identified and prioritized potential corridors for protection in town and regularly reviews Chapter 61 land being taken out of chapter to see if such a parcel would be appropriate for the town to act on its right of first refusal. Mount Grace Land Conservation Trust and the Franklin Land Trust are also pursuing linkages between protected lands by assisting interested landowners in protecting their land through conservation restrictions and other methods.

B. SUMMARY OF COMMUNITY'S NEEDS

Planning for a community's open space and recreation needs must work to satisfy the present population's desires for new facilities, spaces, and services and also interpret and act on the available data to prepare for the future needs of Northfield residents. Although the Northfield Open Space and Recreation Plan will be updated in seven years, the types of actions that are identified in Section 9 take into account the needs of the next generation as well.

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 federal Land and Water Conservation Fund (LWCF) grants and serve as a tool for states to use in planning for future needs and uses of outdoor resources for public recreation and relaxation. As part of the update process to the 2017 SCORP, a survey of Massachusetts residents was conducted to assess their desires and needs for outdoor recreation. The surveys show that the top priority for survey respondents is the desire for more trails of all kinds. Respondents said that they want more town-wide trail systems, hiking trails, and multi-use trails for both walking and bicycling.

The responses from the 2020 Open Space and Recreation Survey distributed to Northfield residents showed that utilization of trails in town could be better promoted through signage and outreach, but that overall, Northfield's trail assets serve the needs of the community well. The most popular trails in town utilized 3 or more times per year by

respondents are: New England Trail - formerly M&M trail (27%), Northfield State Forest - above the Ridge (24%), Northfield Mountain Recreation Area (23%), Northfield State Forest - Alexander Hill Rd (20%), and Alderbrook Meadows - wheelchair-accessible trail (15%).

There was broad support for a network of trails for a range of activities, including bicycling, cross country skiing/snowshoeing, dog walking, hiking/walking, horseback riding, and mountain biking. However ATV use and snowmobiling were opposed by more survey respondents than any other activity. ATV use was supported by 25 percent of respondents, while 44 percent do not support it. Snowmobiling was supported by 49 percent of respondents, while 21 percent indicated no support for snowmobiling. Follow up comments on the trails section express concern for the fossil fuels burned, noise and exhaust emitted, and potential for physical harm to people and the natural environment caused by ATVs and snowmobiles, while they were also recognized as having value for trail maintenance and grooming the snow for skiing in the winter. Other comments outlined strategies where ATVs and snowmobiles could be accommodated on dedicated trails, within permissible hours, and through good relationships with landowners.

Snow scene *(Jerry Wagener)*

According to the 2020 Open Space Survey, the recreational resources in town ranked in terms of importance are:

Very Important:
1) Public access to natural areas (76%)
2) Public access to waterbodies (72%)
3) Hiking trails (70%)
4) Children's play areas (41%)
5) Public swimming pool (39%)

Somewhat Important:
1) Cross Country Skiing/Snowshoeing (38%)
2) Bike trails (37%)
3) Ice skating (37%)
4) Picnic areas (36%)
5) Neighborhood parks (36%)

Not Important:
1) Roller blading and skate boarding (52%)
2) Horseback riding trails (41%)
3) Dog park (37%)
4) Ice skating (31%)
5) Soccer fields (28%)

This question revealed the importance of a public swimming pool, ranked #5 among very important recreational resources in town, because Northfield no longer has a public swimming pool. Several comments on this survey question underscored the importance of a public swimming pool to the community, including its value to families and individuals, as a means of exercise for residents of all ages, and for cooling off in the summer. Lack of access to large natural waterbodies for swimming, kayaking and canoeing also appeared in the comments as an identified need, as did interest in access to a community garden.

With all of the many outdoor recreational resources available in Northfield, the Open Space Committee wanted to know what types of features of a potential Northfield Community Park would be important amongst residents. In the 2020 Survey, respondents were asked to rank and comment on the importance of 15 potential community park features. Access to water topped the list, with (57%) of respondents indicating this as very important, followed by hiking/cross country ski trails (54%), and a bikeway connecting with replacement for Schell Bridge (49%). Many respondents (41%) also felt that a nature play area and a picnic area were very important. Follow up comments emphasized interest in the Schell bridge bikeway and a public swimming pool along with park amenities such as bathrooms, grills, a building for community gathering, and play structures. A few comments favored having a fenced in area for dogs to run off-leash. However, a previous recreational resource question showed that significantly

fewer survey respondents (20%) felt that a dog park was very important than those who felt that a dog park was not important (37%).

When asked about the importance of open space features, almost all respondents (91%) felt that air and water quality are very important open space features in Northfield. The percent of respondents indicating that other open space features are very important is as follows:

1) air and water quality (91%)
2) farms and farmland (83%)
3) forests (89%)
4) trails (74%)
5) rural character (73%)
6) quiet (70%)
7) mountain views (57%)
8) public access for swimming (57%)
9) public access for boating (50%)
10) lower housing density (40%)

Survey respondents commented on how much they value open space, conserved farmland and forests, and associated ecosystem services and environmental benefits. The concern for how to maintain these open space resources while accommodating future development was articulated in several survey comments describing infill and cluster development strategies in which new growth is directed to existing infrastructure and developed areas in town. Comments also echoed the importance of access to water and walking, hiking and biking in town. Given that most of the biking, skiing, and hiking trails in Northfield are hilly, there is a desire for longer, fairly flat trails where seniors could enjoy being in nature without needing to work harder than they are able to.

When asked about supporting land protection and conservation, respondents mostly favored strategies in which the town accepts donated development rights (conservation restriction) (67%), donated conservation land (82%), and conservation by private nonprofits and land trusts (72%). Strategies that involved taking more land off of the town tax roll, raising taxes, or using the Town's own finances to conserve open space were viewed less favorably; Town purchase of development rights (41%) or purchase of conservation land (52%), and increase funding to the Community Preservation Act (56%). Many comments included questions about what these different open space conservation programs were and how they work. The community has a clear need for and interest in more information to educate residents on many of these conservation actions. In particular, the Forever Wild conservation restriction concept drew questions, and one respondent suggested that these conservation actions would be a great topic for public discussion and policy direction in order to help people form their opinion.

The 2020 Open Space and Recreation Survey, discussions at Open Space Planning Committee meetings, and research into the ownership, protection status, and use of existing open space parcels in Northfield, helped to identify several potential community

needs relating to open space and recreation resources. They are: engage Northfield citizens in the care of open space and recreational resources and assist with town-managed conservation areas; work to preserve areas prioritized for biodiversity and climate change resiliency; increase match funding for land preservation; promote the use of and quality of new and existing recreational resources, facilities, and public amenities, and increase access to water and by creating new public swimming areas.

When planning for the recreational needs of a community, all age groups and populations need to be considered. As the population of Northfield continues to age, as is the trend in Northfield and throughout the country, there may be more pressure placed upon the town to provide open space and recreational activities for older citizens. Any future development of land or facilities for open space and recreation should include careful consideration of access for older citizens, as well as for the disabled. These needs should be also addressed as a matter of course under ADA requirements.

The Town of Northfield is a member of the Pioneer Regional School District, so some programming and activities for teens are provided through the school district, rather than Northfield, itself. Since Northfield currently has no public parks, the main public recreation facilities in the town are the trails and Town Forest. These are in rural areas and thus roughly equally accessible to all residents - a means of transportation, usually car, is needed to access these resources. There are roughly 223 acres of open space owned by the Town of Northfield, not including cemeteries. Development of Town-owned land for recreation should be prioritized for handicapped-accessibility and generally flat passive recreation amenities for walking and biking to accommodate Northfield's aging population. Alderbrook Meadows has a wheelchair-accessible trail, however there is interest in developing additional accessible walking trails and a long, flat bike path near the Town Center.

Envisioned in Northfield's 2014 Master Plan[1] is the creation of a comprehensive community park. This would likely be located near the town center and would be convenient for about half of the town's population, comprising all economic groups. Survey respondents also suggested that in addition to the development of more recreational trails for seniors, future uses for town land should prioritize a community park with playing fields, play areas, public gathering facilities, and a nature-based children's playground, as well as improved recreational access to the Connecticut River. However, there is currently no Town-owned land that could accommodate these amenities except behind the elementary school. Brush Mountain, King Phillips Hill, and the Town Forest are dedicated to passive recreation uses only. Any new park, playground, or sports field would likely require that the Town purchase new open space parcels. If parcels were to be developed as parks or playgrounds, they should also be handicapped accessible.

Though Northfield has extensive frontage on both sides of the Connecticut River, there currently are no riverbank trails. Interest in developing such trails, and should that happen, these would be convenient for almost all residents of the town. A project that has been

[1] https://www.northfieldma.gov/sites/northfieldma/files/uploads/a_master_plan_for_northfield.pdf

gaining momentum in town is advocating for shoreline access for boating, swimming, and riverside trails on the Connecticut River, Pauchaug Brook, Mill Brook, and Bennet Meadows, which involve working with private landowners and the Town.

FirstLight, Erosion, and Sedimentation on the Connecticut River

FirstLight owns most of the riverbank and could be instrumental in building an ADA compliant riverside trail, which is one of the Town's top recreation priorities. The Open Space committee envisions such a trail located in a forested area along the river, such as near the Pauchuag Boat Ramp and Schell Bridge, or near Bennet Meadows. FirstLight could be instrumental in additional top recreation priorities identified in this Open Space and Recreation Plan, including building a canoe/kayak launch at Bennet Meadows, increasing access for swimming in the Connecticut River, and working toward a riverside park.

The Connecticut River is an important recreational resource and a key economic driver in Franklin County's natural resource and recreation based tourism economy. In their Amended Final License Applications (AFLAs), FirstLight Resources proposes to maintain their existing recreational facilities in Northfield, Montague and Gill (which were installed in the late 1970's) and fund only ongoing maintenance needs. The Americans with Disabilities Act (ADA), which became law in 1990, was not in effect at the time these facilities were built. The relicensing process is an opportunity to evaluate the ADA needs of the existing recreation facilities and propose upgrades, but FirstLight did not do this.

Instead, FirstLight is proposing to maintain their existing facilities in Northfield, which include Munn's Ferry Boat Camping Recreation Area; Boat Tour and Riverview Picnic Area, and the Northfield Mountain Tour and Trail Center. See an excerpt from Table 3.0-1 from the AFLA Recreation Management Plan, below.

Table 3.0-1: Northfield Mountain Project: Existing FERC-Approved Recreation Sites and Facilities Summary

Recreation Site Name	Recreation Facilities/Amenities
Munn's Ferry Boat Camping Recreation Area	• water access only campsites (approximately 4-5 tent platform sites) • pedestrian foot bridge • picnic area (approximately 1 table) • dock
Boat Tour and Riverview Picnic Area	• parking area (approximately 54 single vehicle spaces; 2 ADA) • restroom (ADA compliant) • picnic area (approximately 10 tables) • pedestrian foot bridge • picnic pavilion (approximately 8 tables) • boat tour • dock
Northfield Mountain Tour and Trail Center	• parking area (approximately 50 single vehicle spaces; 3 ADA) • restroom • picnic area (approximately 7 tables) • overlook • visitor center and interpretive displays • winter area • trail system

FirstLight proposes no significant upgrades to these existing facilities but will need to move the Riverview Boat Tour Dock to accommodate the proposed net to be installed around the Northfield Mountain tailrace to reduce fish entrainment. The proposed layout of the barrier net encloses the existing Riverview Boat Tour Dock. Given this, FirstLight proposes to relocate the dock further upstream of its current location and extend the existing road further north. According to the Riverview Boat Tour Dock Relocation engineering plan submitted as part of their Recreation Management Plan, FirstLight is proposing to add an ADA compliant portable restroom at the existing Riverview parking lot. The plans also show a new proposed kayak launch area attached to the relocated Boat Tour Dock. There is no description of the new kayak launch area in the Recreation Management Plan, nothing on the plan to indicate that the kayak launch area is ADA compliant, and no mention of ADA compliance is included in the description of the new kayak launch area.

FirstLight is proposing to create a new access trail with stairs for a car-top boat put-in at Riverview. This new put-in would be located off of Pine Meadow Road, where Four Mile Brook discharges into the TFI. The site include a 6-foot wide stone path to timber and concrete stairs leading to a put-in on the northern bank along the brook. Pine Meadow Road would be widened to add approximately seven (7) parking spots. This new car-top boat put-in would not be accessible to people with mobility impairments. No ADA compliant structures or amenities for this new facility are proposed by FirstLight.

FirstLight should be proposing significant investments in recreation resources that reflect the Town's needs and support the local and regional economies and recreation needs for the life of the FERC license, which will be in effect through 2070. This is truly a "once in a lifetime" opportunity for the Town's voice to be heard in the FERC relicensing process. As part of the FERC process, the MassDEP will issue a 401 Water Quality Certificate (401WQC) permit for each of the two FirstLight projects (it could be one permit for both but this depends on how FirstLight structures their 401WQC permit application). There are multiple opportunities in the coming 12-18 months for stakeholders in the Town of Northfield to continue advocating for the river, for the protection of valuable prime farmland and riparian and aquatic habitat and recreation resources. The Town should continue working closely with the FRCOG and other local and regional stakeholders during the FERC and 401WQC permitting processes to ensure that the Town's voices are heard.

C. MANAGEMENT NEEDS

Northfield is fortunate to have a great number of organizations interested in the environment in and around the community. There are a number of federal, state, and regional environmental organizations sponsoring land and natural resource protection projects including Mount Grace Land Conservation Trust, Franklin Land Trust, the North Quabbin Regional Landscape Partnership, University of Massachusetts-Amherst, Massachusetts Audubon Society, Trustees of Reservations, New England Forestry Foundation, Harvard University, U.S. Army Corps of Engineers, and various state agencies (Department of Conservation and Recreation, Division of Fisheries and Wildlife, MassWildlife, Department of Agricultural Resources,). The Conservation Commission will continue to work with these organizations on land protection projects in Northfield. Additionally, there may be a need for the town to have the ability to facilitate and coordinate the activities that occur within Northfield so that they most benefit local residents and ecosystems. The appointed Northfield Open Space Committee can act as the liaison to these organizations reporting back to town officials as necessary. Similarly, if town officials are kept abreast of these local and regional efforts, there would be more opportunities for cooperation with adjoining towns.

How a community chooses to spend its fiscal resources is often decided at Town Meeting. However, in many communities the warrant articles prepared ahead of time are often the result of policy discussions among boards and a small proportion of the total population. A major obstacle to implementing the recommendations of this Open Space and Recreation Plan will be the effective coordination of all town boards and commissions in a manner that promotes communication and discussion of open space and recreation issues between boards and among the general public.

SECTION 8

GOALS AND OBJECTIVES

The following goals and objectives were formulated from the results of the 2020 Northfield Open Space and Recreation Planning Survey and reviewed and modified through the public meetings of the Open Space Planning Committee, the public forum process, and associated public comment. All of the goals and objectives will be pursued and implemented within the context of increasing and strengthening Northfield's resiliency to climate change.

Goals and Objectives

Open Space Goal: Ensure that Northfield protects farmland, forest land, scenic views, and other open space vital to sustaining the town's historic rural character and maintaining the quality of air, water, and wildlife habitats.

OS1. STEWARDSHIP
Develop effective means for Northfield citizens to become engaged in the care of the natural and recreational resources of the town.

OS2. COORDINATION
Work with town committees and other organizations to achieve this open space goal.

OS3. FUNDING
Set aside municipal funding each year to be used as a town match to help enable landowners to protect their land through the APR and other appropriate programs.

OS4. CONSERVATION
Work to preserve areas of Northfield that are most important to protect, recognizing the reality of climate change.

OS5. MANAGEMENT
Assist the Conservation Commission Stewardship Advisory Subcommittee in managing town-owned and town-managed conservation areas and conservation restrictions held by the town.

OS6. CONSERVATION AREAS
Work on protecting areas identified by residents and/or BioMap2/ the Northfield Greenprint as high priority.

Recreation Goal: Ensure that Northfield maintains and improves the variety, quality, and accessibility of recreational facilities important in the twenty-first century for health and

well-being of all residents, and promote the use of these facilities and any organized programming thereof.

R1. COMMUNICATION
Work collaboratively with town boards, committees, and community organizations to achieve the Recreation Goal.

R2. TRAILS
Promote the use of new and existing trails in Northfield, and develop and/or improve trail systems throughout the town.

R3. RECREATION ACCESS TO THE CONNECTICUT RIVER
Increase the number of public access points on the Connecticut River.

R4. RECREATIONAL FACIITIES
Work with the Community Park Committee and Recreation Commission to create recreational facilities of public interest.

View of Mt. Grace and Mt. Monadnock from the Richard-Zlogar Cabin on the New England Trail *(Julia Blyth)*

SECTION 9

SEVEN – YEAR ACTION PLAN

The Seven-Year Action Plan fulfills the Open Space and Recreation Plan objectives. The objectives address open space, natural resources, recreation, and community development needs because the quantity and quality of accessible open space relates directly to the state of Northfield's environment; the Town's recreational opportunities; and the quality of future development in Northfield. The objectives are listed in the far left column of Table 9-1 and are followed by recommended actions, responsible board or group, start date, and potential funding sources. By implementing the recommended actions, each objective will begin to be realized.

Implementing the Open Space and Recreation Plan 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, Planning Board, Zoning Board, Highway Department, Board of Health, Conservation Commission, Recreation Commission, Community Preservation Committee, and the Historical Commission. In addition, Mount Grace and Franklin Land Trusts are listed as active and necessary partners in this Action Plan.

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

Northfield is working to become a state-designated Municipal Vulnerability Preparedness (MVP) Community in 2021, which will make the Town eligible to apply for funding from the Massachusetts MVP Action Grant program. MVP Action Grants target climate resiliency projects, which often have strong intersections with Open Space and Recreation planning objectives. Several action items identified in this OSRP align well with MVP grant opportunities, including land protection prioritization methods, protecting upland watershed open space and habitat, mitigating invasive species, and engaging residents and landowners in the stewardship of natural resources. Actions with these intersections represent opportunities to leverage work with MVP funds.

A successful Open Space and Recreation Program, under the primary stewardship of an Open Space Committee, can achieve all of the action steps listed below over time. However, it will be important to establish priorities for the first seven years. The Open Space Planning Committee has prioritized action steps by the goals and objectives listed in the previous chapter. Prioritized action steps are represented on the Seven-Year

Action Plan Map and are outlined in greater detail in Table 9-1. The most important action steps for Northfield in the next seven years include:

- Organize private land management educational events, perhaps in coordination with library, such as presentations or workshops on forest carbon offsets, pollinators, habitat management, forever wild, etc;
- Promote the execution of the Pioneer Valley Regional School Land Management Plan that encourages conservation, open-air educational options, and recreation on the school's 90-acre parcel;
- Promote increased funding of the Community Preservation Act (CPA);
- Identify scenic views, roads and byways, and special places;
- Discuss ways to provide land protection and estate planning information to landowners in the region (Northfield, Gill, Erving, Bernardston);
- Update and maintain the OSC document describing priorities of chapter 61 areas for the town to preserve should the land be removed from chapter 61;
- Protect: Mill Brook area between Main Street and Birnam Rd and South of Mill Brook; Crag Mountain access to the New England National Scenic Trail; any areas along the river that become available; and the Bald Hills Area: ecologically important as wildlife corridor, scenic views;
- Post updated trail maps, opportunities for stewardship volunteers, and educational events on Nextdoor or other local forums;
- Maintain the printed Northfield Trails brochure and the Northfield Trails website;
- Maintain the Mill Brook trail, repairing the crossing of Mill Brook east of the library at the corner of Dickinson Road, and manage for invasive species;
- Build a canoe/kayak launch at Bennett Meadows Wildlife Management Area.;
- Propose accessible river-front walkways and river-viewing stations;
- Improve the shoreline access just north of the boat ramp at Pauchaug Brook for kayak/canoe launching;
- Increase access for swimming in the Connecticut River, working toward a riverside park; and
- Build a path connecting the Schell Pedestrian Bridge to Pauchaug Boat Ramp.

Schell Bridge on the Connecticut River; site of future pedestrian bridge *(Jerry Wagener)*

Table 9-1: Recommended Actions of the 2020 Northfield Open Space and Recreation Plan

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
Open Space Goal: Ensure that Northfield protects farmland, forest land, scenic views, and other open space vital to sustaining the town's historic rural character and maintaining the quality of air, water, and wildlife habitats.				
OS1. STEWARDSHIP Develop effective means for Northfield citizens to become engaged in the care of the natural and recreational resources of the town.	Recognize outstanding citizen stewards.	Open Space Committee (OSC)	Ongoing	Volunteer time
	Conduct a workday for people of all ages to participate in the care of public conservation land and recreational areas.	OSC	Ongoing	Volunteer time

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
	Work with Stewardship Advisory Subcommittee to plan outreach activities for the Town Forest, King Philips Hill, Brush Mountain, and other conservation areas.	OSC	Ongoing	Volunteer time
	Encourage town residents to participate in the Keystone forest management program sponsored by UMass, and other conservation management programs.	OSC	Ongoing	Volunteer time
	Organize private land management educational events, perhaps in coordination with library, such as presentations or workshops on forest carbon offsets, pollinators, habitat management, forever wild, etc.	OSC	Ongoing	Volunteer time
OS2. COORDINATION Work with town committees and other organizations to achieve this open space goal.	Discuss conservation goals with area land trusts.	OSC	Ongoing	Volunteer time
	Bring land trust representatives to Northfield with programs on the value of land conservation, wildlife protection, etc.	OSC	Ongoing	Volunteer time
	Promote the execution of the Pioneer Valley Regional School Land Management Plan that encourages conservation, open-air educational options, and recreation on the school's 90-acre parcel.	OSC	Ongoing	Volunteer time
	Work with the Planning Board to explore updating solar & wind bylaws.	OSC	Ongoing	Volunteer time
	Work with organizations and agencies that are protecting water resources.	OSC	Ongoing	Volunteer time

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
OS3. FUNDING Set aside municipal funding each year to be used as a town match to help enable landowners to protect their land through the APR and other appropriate programs.	Promote increased funding of the Community Preservation Act (CPA).	OSC, Community Preservation Committee (CPC)	ongoing	volunteer time
	Use CPA funds for conservation proposals; Apply for relevant state LAND and other grants for funding activities associated with preserving open space (matching to come from CPA funds).	OSC, CPC	ongoing	volunteer time
	Request town funds to be set aside to pay to exercise the town's right-of-first refusal on high-priority properties being taken out of Chapter 61.	OSC, CPC	ongoing	volunteer time
	Provide information for residents about different estate planning/ conservation funding or land-holding options such as Conservation Restrictions, APR, land trusts owning land in fee, state ownership, donated town conservation land, etc.	OSC, CPC	ongoing	volunteer time
	Provide information to residents about the cost of community services.	OSC, CPC	ongoing	volunteer time
OS4. CONSERVATION Work to preserve areas of Northfield that are most important to protect, recognizing the reality of climate change.	Identify scenic views, roads and byways, and special places.	OSC, Conservation Commission (CC)	ongoing	volunteer time
	Promote the conservation priorities identified in the Trust for Public Land Greenprinting of Northfield.	OSC, CC	ongoing	volunteer time

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
	Work with landowners to improve and preserve for public enjoyment natural environments such as scenic views and other landscape features.	OSC, CC	ongoing	volunteer time
	Discuss ways to provide land protection and estate planning information to landowners in the region (Northfield, Gill, Erving, Bernardston).	OSC, CC	ongoing	volunteer time
	Support the Historical Commission and the Historical Society in efforts to preserve the historical character of the town.	OSC, CC	ongoing	volunteer time
	Update and maintain the OSC document describing priorities of chapter 61 areas for the town to preserve should the land be removed from chapter 61.	OSC, CC	ongoing	volunteer time
OS5. MANAGEMENT Assist the Conservation Commission Stewardship Advisory Subcommittee in managing town-owned and town-managed conservation areas and conservation restrictions held by the town.	Discuss with the Conservation Commission Stewardship Advisory Subcommittee ways the Open Space Committee can assist with the stewardship of the Northfield Town Forest, King Philips Hill, Brush Mountain, and potential protected land.	OSC, CC	ongoing	volunteer time
	Arrange for briefings on the management of wetlands and protected land, and promote attendance at stewardship monitoring workshops.	OSC, CC	ongoing	volunteer time

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
OS6. CONSERVATION AREAS **Work on protecting areas identified by residents and/or BioMap2/ the Northfield Greenprint as high priority.**	1. Mill Brook area between Main Street and Birnam Rd and South of Mill Brook. 2. Crag Mountain; access to the New England National Scenic Trail. 3. Any areas along the river that become available. 4. Any land along Louisiana Brook that becomes available. 5. Beers Mountain historic/ scenic viewpoint area. 6. Bald Hills Area: ecologically important as wildlife corridor, scenic views.	OSC	ongoing	volunteer time
Recreation Goal: Ensure that Northfield maintains and improves the variety, quality, and accessibility of recreational facilities important in the twenty-first century for health and well being of all residents, and promote the use of these facilities and any organized programming thereof.				
R1. COMMUNICATION **Work collaboratively with town boards, committees, and community organizations to achieve the Recreation Goal.**	Members of the OSC will include representatives of related Town boards and commissions, including from the Conservation Commission, Stewardship Advisory Subcommittee, Planning Board, Historical Commission and Recreation Commission.	OSC	ongoing	volunteer time
	Maintain regular contact with each group.	OSC	ongoing	volunteer time
	Keep an OSC mailing list.	OSC	ongoing	volunteer time
	Post things like updated trail maps, opportunities for stewardship/ volunteers, and educational events on Nextdoor or other community websites or online groups.	OSC	ongoing	volunteer time

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
R2. TRAILS **Promote the use of new and existing trails in Northfield, and develop and/or improve trail systems throughout the town.**	Maintain the printed Northfield Trails brochure and the Northfield Trails website.	OSC, Northfield Trails Association (NTA)	ongoing	volunteer time, Town funds
	Assist in evaluating and acquiring trail signage, trailhead parking signage, and kiosks.		ongoing	DCR grants, CPA funds
	Work with the Northfield Highway Department to design, create, and install parking signage for trailheads and hiker safety signs where the trail crosses the road.		2024	volunteer time, Staff time, Town Funds
	Monitor existing trail systems and respond to needs as they arise.		ongoing	DCR grants, CPA funds
	Create new trails on public lands or private lands with permission, including plans for their maintenance and management.		ongoing	Town funds
	Maintain the Mill Brook trail, repairing the crossing of Mill Brook east of the library at the corner of Dickinson Road, and manage for invasive species.		2026	Town funds, DCR grants, F&W?
	Organize a trails weekend to promote local trails, historic, farm resources.		2023	Town Funds, state funds
R3. RECREATION ACCESS TO THE CONNECTCUT RIVER **Increase the number of public access points on the Connecticut River.**	Facilitate the building of a canoe/kayak launch ramp at Bennett Meadows Wildlife Management Area.	OSC Recreation Commission	2024	DCR grant, FLP
	Propose accessible river-front walkways and river-viewing stations.		2022	volunteer time

OBJECTIVE	ACTION	RESPONSIBLE BOARD/GROUP	START DATE	POTENTIAL FUNDING SOURCES
	Advocate to improve the shoreline access just north of the boat ramp at Pauchaug Brook for kayak/canoe launching.		ongoing	volunteer time
	Increase access for swimming in the Connecticut River, working toward a riverside park (such as West River Park in Brattleboro).		2024	volunteer time
R4. RECREATIONAL FACIITIES **Work with the Community Park Committee and Recreation Commission to create recreational facilities of public interest.**	Work with landowners to develop a swimming area and town beach on the south side of Mill Brook, between Main Street and Birnam Road.	OSC, Recreation Commission	2026	DCR grant
	Build a bikeway connecting to the Schell Pedestrian Bridge.		2026	CPA funds
	Work with the Community Park Committee to find space for a community park including playing fields, play areas, and public gathering facilities.		ongoing	
	Work with interested parties to establish play areas in town.		ongoing	DCR grant

SECTION 10

PUBLIC COMMENT

Public feedback, sought throughout the entire open space and recreation planning process, is difficult to document due to the fact that the draft plans constantly incorporated these changes and enhancements. A more direct request for feedback was presented in the public forum, which was held on February 10, 2021. Comments received during the public forum and the period after to the forum have all been incorporated into the Plan.

Copies of the final version of the Northfield Open Space and Recreation Plan were sent to the Massachusetts Division of Conservation Services (DCS), the Northfield Select and Planning Boards, Open Space Committee, Conservation Commission, and the Mount Grace Land Trust for comment. Their comment letters are inserted into the plan at the end of this section.

An Open Space and Recreation Plan Public Forum was held on February 10, 2021, in a virtual format from 6:30 to 8:00 pm to obtain feedback about the draft plan and its recommendations. Email announcements advertising the meeting were distributed prior to the meeting. Notices about the meeting were also posted on the town website and emailed to all boards and committees. __ residents attended the forum, including members of the following committees: Open Space Committee, Conservation Committee, Select Board, Historical Commission, and Council on Aging. At the Forum, there was wide agreement with the draft findings and recommendations. The discussion of the Forum focused on ways to increase access to the Connecticut River and the desire to prioritize the creation of an ADA accessible public trail in Town.

Johnson Farm *(Jerry Wagener)*

SECTION 11

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APPENDIX A

Town of Northfield

ADA Self Evaluation Report

TOWN OF NORTHFIELD

ADA INVENTORY

SELF-EVALUATION OF TOWN
RECREATIONAL PROGRAMS AND PARKS

INTRODUCTION

The Town of Northfield has undertaken a Self Evaluation of its recreational programs, practices, and recreation facilities in order to assess their compliance with Title II of the Americans with Disabilities Act (ADA) regulations. The objective of the Self Evaluation is to identify and bring into reasonable compliance programs and practices that do not currently meet the requirements of the Act. The three major elements outlined below have been assessed for this evaluation. By evaluating these three elements, Northfield will work to comply with ADA Self Evaluation regulations.

1) Site Accessibility: is the site accessible to persons with disabilities?

2) Program and Service Accessibility: are the programs and services offered available to all persons, regardless of their disability?

3) Employment Practices: Are employment decisions made without discrimination on the basis of disability? Are reasonable accommodations made for employees who may require them? Are employment notices in formats accessible to people with sight or hearing disabilities?

ADA COORDINATOR

The ADA requires public entities with 50 or more employees to designate at least one employee to coordinate its efforts to comply with Title II and investigate any complaints of ADA-related discrimination. The Board of Selectmen has designated Town Administrator, Andrea Llamas, to act in this capacity.

PUBLIC NOTIFICATION

A public entity is required to inform applicants, participants, beneficiaries and other interested parties of their rights and protections afforded by the ADA. A copy of the Public Notice of the Town of Northfield's Policy of Non Discrimination on the Basis of Disability is placed at the back of this document.

GRIEVANCE PROCEDURE

Also required by ADA regulations is a formal grievance procedure by which complaints of ADA violations may be resolved. The Town of Northfield's ADA Grievance Procedure is placed at the back of this document.

EMPLOYMENT PRACTICES
The Town of Northfield's employment practices are in compliance with the ADA regulations, especially regarding: recruitment, personnel actions, leave administration, training, tests, medical exams/questionnaires, social and recreational programs, fringe benefits, collective bargaining agreements, and wage and salary administration. A signed statement from the Town's ADA Coordinator attesting to this can be found at the back of this document.

SITE ACCESSIBILITY
The following inventory describes the parks, playgrounds, and historic sites in the Town of Northfield that are under the jurisdiction of the Town. The inventory includes a description of the facilities, accessibility needs, and recommendations for modifications, which would help to provide people with disabilities equal access to these resources. The specific recommendations for each site are summarized in a table, the ADA Transition Plan, at the end of this document. The standards by which the park facilities are judged are from the Massachusetts Division of Conservation Services and are based on state and federal guidelines.

Northfield Elementary School Playground

The Town of Northfield Elementary School includes a playground and sports field complex in back of the school and on the southern side of the building. There are two handicapped accessible parking spaces in back of the school closest to the rear entrance. There is no paved or other hard surfaced path connecting the parking areas with the sports field bleachers, basketball court, or playground equipment.

King Philips Hill

This is a parcel of land approximately fourteen acres in size that is located off Old Bernardston Rd. near Rte. 10, west of the Connecticut River. An historical marker is located at the base of the hill describing how King Phillip and other Native Americans used the hill as a defensive position in the 1600s. The hill is very steep and currently completely inaccessible for people with physical disabilities. Efforts to improve its accessibility would appear to be impractical. To increase the site's accessibility would require a severe impact to the natural state of the area, which would likely compromise the site's historical value. There is no designated accessible parking.

Brush Mountain / Northfield Town Forest

Brush Mountain is an area about 50 acres purchased by the town in 2006; it is at the top of Brush Mountain where the New England Trail (NET, formerly the M&M Trail) passes. It also encompasses the Calvin Swan historic homesite. Adjacent to and downhill to the west of this 50 a cres is the approximately 150 acres of the Northfield Town Forest. The 150 acres was purchased with Forest Legacy funds and donated to the town in 2011. Both properties front on Gulf Road and are accessible via a parking area and kiosk at the top of Gulf Road.
The NET is an unimproved but maintained forest trail; it is walkable by persons with minor ambulatory disabilities, but is not wheelchair negotiable. The town forest area has two old

logging roads that are fairly level (though one does go down a gentle hill at one end) and are quite open for walking and are relatively accessible to persons of all ages and abilities. There are no plans to pave these trails, however, to make them wheelchair-accessible. There is no designated accessible parking.

PROGRAM AND SERVICE ACCESSIBILITY

The Town of Northfield currently provides most of its recreational programs through the Northfield Recreation Commission. Other programs and community activities are offered for Town residents through the Dickinson Memorial Library and Senior Center. The Library is accessible, with ADA parking, an automatic (push-button) door, and an elevator just inside the back entrance. The Senior Center is currently accessible for persons with disabilities.

APPENDIX A-1: ADA COORDINATOR

TOWN OF NORTHFIELD
www.northfieldma.gov
69 MAIN STREET
NORTHFIELD, MASSACHUSETTS 01360-1017

ADA Coordinator Designation Form

ADA Coordinator Name: Andrea Llamas

Name of Town Department the ADA Coordinator Works: Selectboard Office/Administration

Job Title: Town Administrator

E-Mail: allamas@northfieldma.gov

Phone: (413) 498-2901 x115

Address: 69 Main Street, Northfield, MA 01360

Date Appointed: September 14, 2020

Is this Appointment: **PERMANENT** or Acting

Does this ADA Coordinator report directly to the appointing authority? **YES** or no

Are the ADA Coordinator Duties Full-Time or **PART-TIME**

Direct Supervisor (Name and Title): Selectboard (See Chair Below)

Appointing Authority Signature: Date: September 14, 2020

_____ _____ _____

Alex R. Meisner, Chair Heath F. Cummings Barbara L. Jacque
Town of Northfield Selectboard

ADA Coordinator Signature: Date: September 14, 2020

APPENDIX A-2: PUBLIC NOTIFICATION

Town of Northfield ADA Public Notice

TOWN OF NORTHFIELD
www.northfieldma.gov
69 MAIN STREET
NORTHFIELD, MASSACHUSETTS 01360-1017

PUBLIC NOTICE

In accordance with the requirements of title II of the Americans with Disabilities Act of 1990 ("ADA"), the Town of Northfield will not discriminate against qualified individuals with disabilities on the basis of disability in its services, programs or activities.

Employment: The Town of Northfield does not discriminate on the basis of disability in its hiring or employment practices and complies with all the regulations promulgated by the U.S. Equal Employment Opportunity Commission under title I of the ADA.

Effective Communication: The town of Northfield will generally, upon request, provide appropriate aids and services leading to effective communication for qualified persons with disabilities so they can participate equally in the Town of Northfield's programs, services, and activities, including qualified sign language, interpreters, documents in Braille, and other ways of making information and communications accessible to people who have speech, hearing, or vision impairments.

Modifications to Policies and procedures: The Town of Northfield will make all reasonable modifications to policies and programs to ensure that people with disabilities have an equal opportunity to enjoy all of its, programs, services, and activities. For example, individuals with service animals are welcomed in the Town of Northfield offices, even where pets are generally prohibited.

Anyone who requires an auxiliary aid or service for effective communication, or a modification of policies or procedures to participate in a program, service, or activity of the Town of Northfield, should contact the office of the Town Administrator as soon as possible but no later than 48 hours before the scheduled event.

The ADA does not require the Town of Northfield to take any action that would fundamentally alter the nature of its programs, services, or impose an undue financial or administrative burden. Complaints that a program, service, or activity of the Town of Northfield is not accessible to persons with disabilities should be directed to the Town Administrator.

The Town of Northfield will not place a surcharge on a particular individual with a disability or any group of individuals with disabilities to cover the cost of providing auxiliary aids/services or reasonable modifications of policy, such as retrieving items from locations that are open to the public but are not accessible to persons in wheelchairs.

APPENDIX A-3: GREVIANCE PROCEDURE

Town of Northfield Discrimination Grievance Procedure from Personnel Policies, adopted by the Select board, September 2020

Grievance Procedure under the Americans with Disabilities Act

This Grievance Procedure is established to meet the requirements of the Americans with Disabilities Act of 1990 ("ADA"). This may be used by anyone who wishes to file a complaint alleging discrimination on the basis of disability in the provision of services, activities, programs, or benefits by the Town of Northfield.

The Town of Northfield's Personnel Policy governs employment-related complaints of disability discrimination. The complaint should bin in writing and contain information about the alleged discrimination such as name, address, phone number of complainant and location, date and description of the problem. Alternative means of filing complaints, such as personal interviews or a tape recording of the complaint, will be made available for persons with disabilities upon request.

The complaint should be submitted by the grievant and/or his/her designee as soon as possible, but no later than 60 calendar days after the alleged violation to: The Town Administrator, Northfield Town Hall, 69 Main Street, Northfield, MA 01360.

Within 15 calendar days after receipt of the complaint, the Town Administrator or the Town Administrator's designee will meet with the complainant to discuss the complaint and the possible resolutions. Within 15 calendar days of the meeting, the Town Administrator or the Town Administrator's designee will respond in writing, and where appropriate, in a format accessible to the complainant, such as large print, Braille, or audio tape. The response will explain the position of the Town of Northfield and offer options for substantive resolution of the complaint.

If the response by the Town Administrator or the Town Administrator's designee does not satisfactorily resolve the issue, the complainant and/or his/her designee may appeal the decision within 15 calendar days after the receipt of the response to the Selectboard or the Selectboard's designee.

Within 15 calendar days after receipt of the appeal, the Selectboard, or the Selectboards's designee will meet with the complainant to discuss the complaint and possible resolutions. Within 15 calendar days after the meeting, the Selectboard or the Town Selectboard's designee will respond in writing, and, where appropriate, in a format accessible to the complainant, with a final resolution of the complaint.

All written complaints received by the Town Administrator or the Town Administrator's designee, appeals to the Selectboard or the Selectboard's designee, and responses from these town offices will be retained by the Town of Northfield for at least three years.

APPENDIX A-4: EMPLOYMENT PRACTICES

Town of Northfield ADA Statement from Personnel Policies, adopted by the Select board, September 2020

ADA Non-Discrimination

The Town recognizes the right of individuals to work and advance on the basis of merit, ability, and potential without regard to age, sex, marital status, race, color, creed, national origin, disability, veteran status, military status, or sexual orientation. Non-discrimination and equal opportunity are the policy of the Town in all of its employment programs and activities.

The Town is also committed to taking affirmative measures to ensure equal opportunity in the areas of recruitment, hiring, promotion, demotion or transfer, layoff or termination, rates of compensation, in-service training programs, and all other terms and conditions of employment. The town is committed to fostering and encouraging a workplace comprised of individuals of diverse backgrounds, age, sex, marital status, race, color, creed, national origin, disability, veteran status, military status, and sexual orientation.

Based on this understanding, the Town shall:

- Recruit, hire and promote in all job classifications without regard to age, sex, marital status, race, color, creed, national origin, disability, veteran status, military status, or sexual orientation.
- Make decisions about employment so as to encourage the development of a diverse workforce.
- Ensure that employment and promotion decisions are made in accordance with the principles of equal opportunity but imposing only valid, job-related requirements for employment and promotional opportunities.
- Ensure that all other personnel actions such as compensation, benefits, transfers, layoff, recall, training, and social and recreational programs will be administered without regard to age, sex, marital status, race, color, creed, national origin, disability, veteran status, military status, or sexual orientation.
- Prohibit any kind of harassment based on age, sex, marital status, race, color, creed, national origin, disability, veteran status, military status, or sexual orientation.

No retaliatory action against those persons who file complaints of discrimination or against individuals who cooperate in such investigations will be tolerated. Violation of this policy will lead to appropriate disciplinary action up to and including termination from Town service.

Anyone who feels that he or she has been discriminated against by the Town on the basis of age, sex, marital status, race, color, creed, national origin, disability, veteran status, military status, or sexual orientation in employment practices may file a grievance in accordance with the procedures described in Section 5.16 of this Policy.

All Town employees shall comply with requirements of the regulations contained in the Americans with Disabilities Act of 1990.

The Town will not discriminate against people with disabilities in any employment practices or in terms, conditions or privileges of employment, including, but not limited to: application, testing, hiring, assignment, evaluation, disciplinary action, training, promotion, medical examination, layoff/recall, termination, compensation, leaves or benefits.

The Town has and will continue to establish occupational qualifications for each position, including the education, skills, and work experience required, and the physical, mental and environmental standards necessary for job performance, health, and safety. Such standards are job-related and consistent with business necessity.

The Town will provide reasonable accommodation to the known physical or mental limitations of a qualified applicant or employee unless such accommodation will impose undue hardship on the Town.

Andrea Llamas

Northfield ADA Transition Plan for the Northfield Open Space & Recreation Plan

Northfield Elementary School

Physical Obstacles	Type of Action to be Taken	Implementation Schedule	Responsible Party
Surface under play structures do not allow easy mobility.	Replace wood chips with an organic material called "fibar," or comparable material, that allows for more mobility.	Medium term	Recreation Committee
There are no paths from the parking lot to the field bleachers, basketball court, or playground.	Create a smooth, stable path from parking area to field and each of the facilties (bleachers, concession stand, benches)	Long term	Recreation Committee
Benches on basketball court do not have backs for support.	Replace benches with back support.	Short term	Recreation Committee

King Phillips Hill

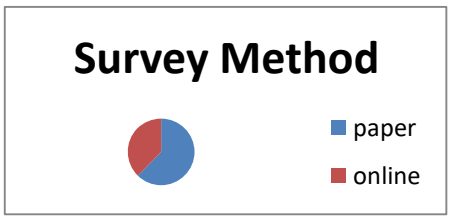
Physical Obstacles	Type of Action to be Taken	Implementation Schedule	Responsible Party
There is no ADA parking designated.	Designate at least 1 ADA spaces at the parking space.	Medium term	Recreation Committee
Surface of trail on King Phillips Hill is rugged and steep.	No action. Creating an accessible path to the top of the hill would damage the historical nature of the site.		

Brush Mountain/Northfield Town Forest

Physical Obstacles	Type of Action to be Taken	Implementation Schedule	Responsible Party
There is no ADA parking designated.	Designate at least 1 ADA spaces at the parking space.	Medium term	Recreation Committee
Trail is rugged and uneven.	Continue to maintain trail for individuals with minor ambulatory disabilities. Creation of a wheelchair accessible trail is not practical.	Ongoing	Recreation Committee

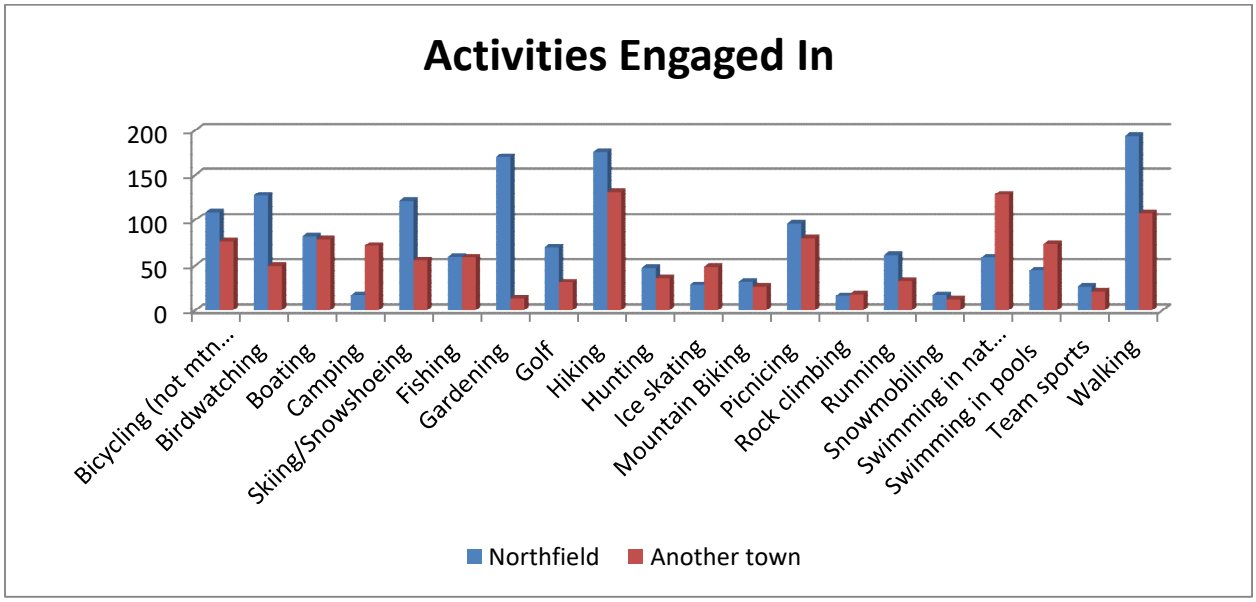
Open Space Survey Jan- March 2020.

	paper	online
	149	90
Total		**239**



1. Please indicate which activities you engage in and whether you are able to enjoy them in Northfield and/or another town.

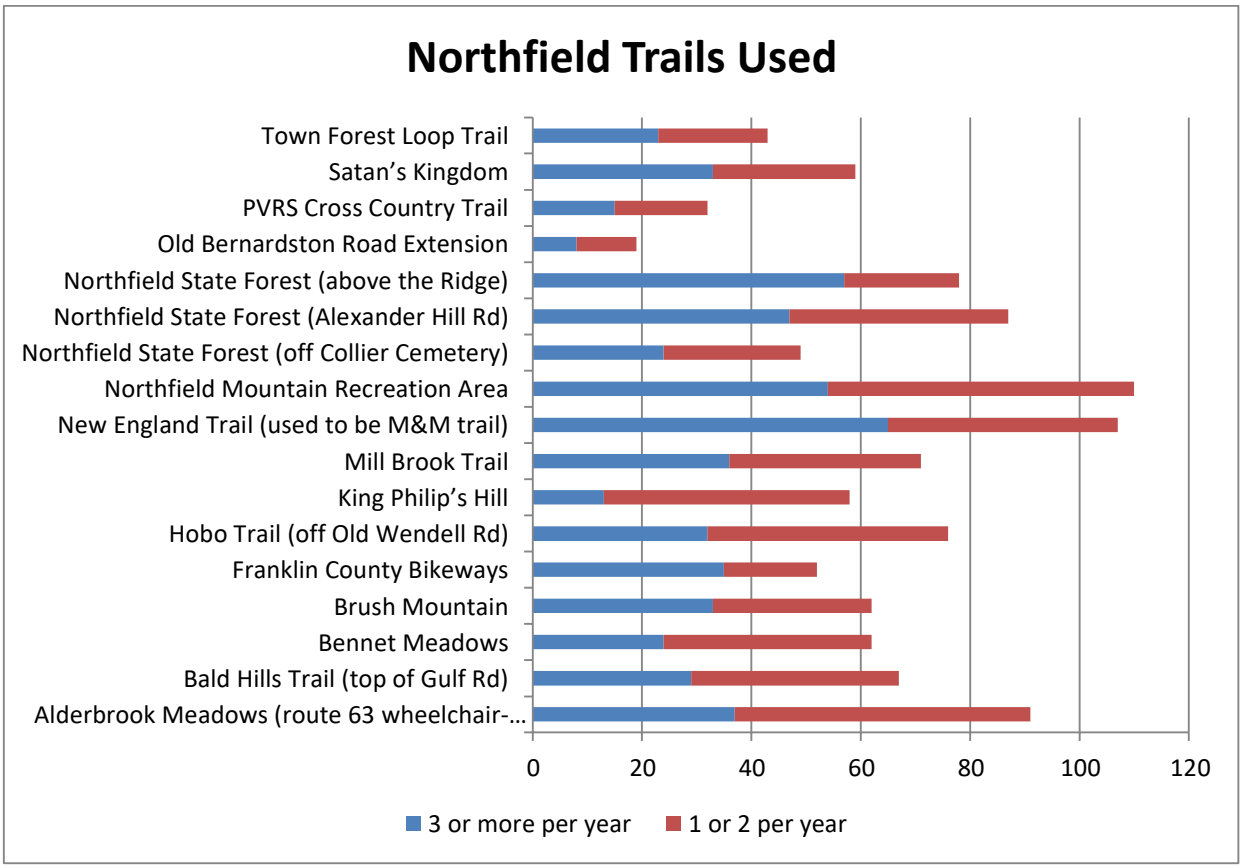
	Northfield	Another town
Bicycling (not mtn biking)	109	77
Birdwatching	128	50
Boating	82	79
Camping	17	72
Skiing/Snowshoeing	122	56
Fishing	60	59
Gardening	170	13
Golf	70	31
Hiking	176	132
Hunting	48	36
Ice skating	28	49
Mountain Biking	32	26
Picnicing	96	80
Rock climbing	16	18
Running	62	33
Snowmobiling	17	12
Swimming in nat water	59	129
Swimming in pools	45	74
Team sports	26	21
Walking	194	108



1. Activities: Other activities, or comments
Promote more business to town.
downhill skiing
the Inn Pool is definitely missed!! Boating=canoeing. I like to skate on frozen puddles on campus along Winchester Rd when ponds not frozen well
Foraging wild edible plants, fungi
Ride across multiple towns but start and end in Northfield.
We miss having valuable asset to our town regardless of frequency of our use.
snowshoeing in Northfield and another town
Trying snowshoeing at NFD Mtn is on my list :)

2. Do you use any of the trails in Northfield? If so, please indicate which ones and how often you use them.		
	3 or more per year	1 or 2 per year
Alderbrook Meadows (route 63 wheelchair-accessible trail)	37	54
Bald Hills Trail (top of Gulf Rd)	29	38
Bennet Meadows	24	38
Brush Mountain	33	29
Franklin County Bikeways	35	17
Hobo Trail (off Old Wendell Rd)	32	44
King Philip's Hill	13	45
Mill Brook Trail	36	35

New England Trail (used to be M&M trail)	65	42
Northfield Mountain Recreation Area	54	56
Northfield State Forest (off Collier Cemetery)	24	25
Northfield State Forest (Alexander Hill Rd)	47	40
Northfield State Forest (above the Ridge)	57	21
Old Bernardston Road Extension	8	11
PVRS Cross Country Trail	15	17
Satan's Kingdom	33	26
Town Forest Loop Trail	23	20

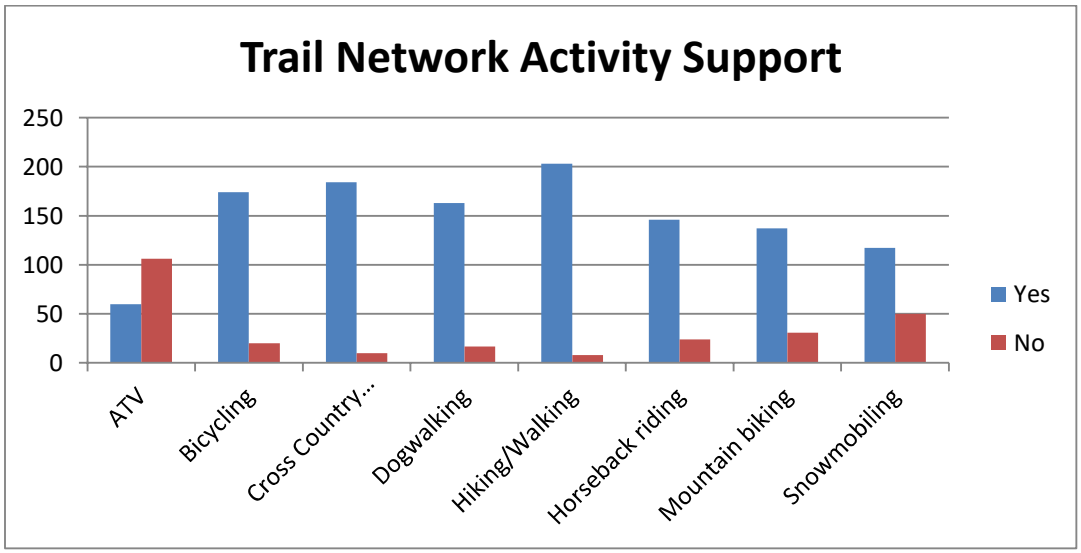


2. Trails: Other trails, or comments
I don't hike due to ticks. I have used some trails in the past.
Promote more business to town.
Old NMH campus woods trails 3+ per year. I recreate a lot elsewhere due to my job but love what Northfield has to offer and plan to be more active here when I retire.
Have the map now. Will do more
Northfield State Forest - School St/Warwick Rd. 3+ times/yr
We need more easy trails.

Not aware of these (Bennett meadow, Brush)
What is this? (Old Bernardston ext)
Did not know if PVRS XC trail is open to public. Would use it if I thought it was.
"Typically walk on side roads or downtown. Was not aware of all these trails and locations. Maybe a town brochure with maps of these trails could be distributed to town residents."
I hope to explore these in the next few years
Does Northfield have a map of these trails?
Plan to use trails in the future.
I do not know where a lot of these trails are LOCATED!!!
It would have been helpful if you included a map here. I use many trails but don't always know what they are called.
Do not recognize all areas as described/listed above
Don't know where most of these are
I would love to know more about some of these trail options. Some of them I had never heard of.
Our wonderful sidewalks and side roads for walking and running.
Would like a Trail Map of trails in Northfield
I never feel the trails are marked well enough in Northfield...it makes me nervous to hike here (besides Northfield Mt). Although, it's been a few years since I've tried...maybe it's better now?
Same as above. Have not been. Would love to.
Trails at NMH
I wish the trails above the Ridge had markers and a map.
Allowing atv access in the northfield state forest and satan's kingdom areas would bring revenue to the town through tourism and revenue to the state through more atv registration.
trails need more frequent maintenance and upkeep
I always enjoyed the fields and trails on the former Northfield Mt. Hermon campus, walking up to the Reservoir, walking on Winchester and Pierson Road
As a professional forester I walk the woods and trails of Brush Mountain (aka Mish om assek) many times each spring.
Once a month on Mill Brook Trail; where is Town Forest Loop Trail? Don't know about some of these!
I need to start to walk/hike these trails! I am so glad they are there for our use!
I mostly hike and enjoy trails on my own property or Gulf Rd. These connect to the NE Trail & Crag Mt.
I really really want to retire so I can use these trails. Used to years ago.

3. Do you support a network of trails for the following activities?		
	Yes	No
ATV	60	106
Bicycling	174	20
Cross Country Skiing/Snowshoeing	184	10
Dogwalking	163	17
Hiking/Walking	203	8
Horseback riding	146	24

Mountain biking	137	31
Snowmobiling	117	50

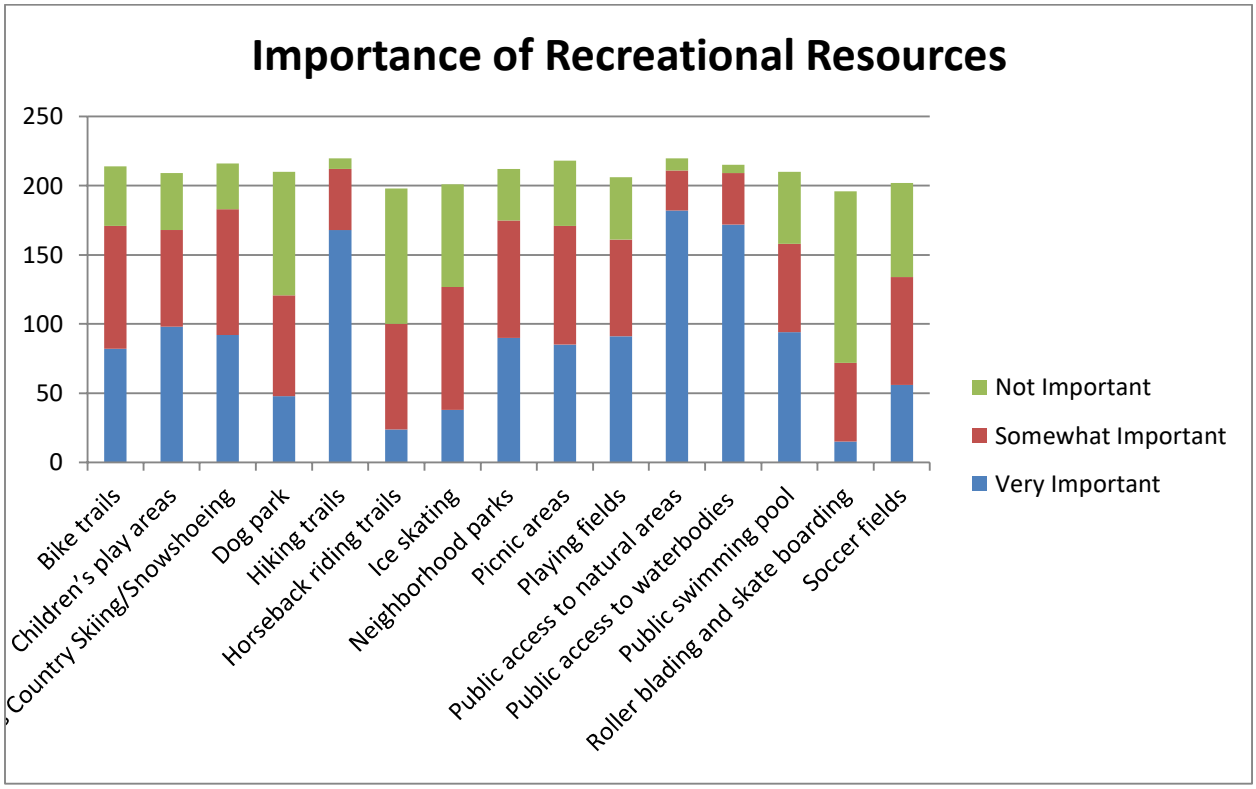


3. Trail activities: Other activities, or comments
Don't support any trails at town expense.
Mountain bike trails and hiking trails need to be separate.
Promote more business to town.
Believe ATVs are destructive - need strict limits.
I appreciate trail networks of all kinds, even if I don't do the activities myself.
I also hike a lot off trail in forested areas.
Walking trail for mobility impaired - easy, flat, benches, short, etc.
I would be very excited to see ATV usage in Northfield
I think everyone in town should have a place to do what they enjoy.
ATV. "They tear up woods, burn fossil fuel and spew exhaust
Snowmobiles ditto
Machines eat trails.
"It would be wonderful if we had a town-run program for horseback riding."
Mountain biking in areas where erosion won't be an issue.
Snowmobile trail: use existing network.
ATV and Snowmobiling, while fun for some, can echo so easily here and disturb the quiet. With noise restrictions, certain permissable hours, and adjacent neighbors permission, these might be a possibilty
non-motorized
ATVs need to have their own trails and get organized into a club like the snowmobilers who police themselves and maintain good relationships with landowners.

People need to be encouraged to pick up after their dogs, especially in the highland ave tennis Court area We need places to dispose of dog bags and possibly neighbors could coordinate disposal. it is unsightly and also contaminates storm water.
Heavy ATV use can be very damaging to trails. Light use not so much.
lots of work but would be beneficial to groom trails for xc skiing
For those not marked, I am ambivalent.
re. bicycling: "depends on where"
ATVs only for maintenance or trail care
swimming, camping
I guess ATV and snowmobile trails are fine as long as they are not on hiking trails for safety sake!
ATVs are deadly.
Pool!
I'd love to see better coordination of sharing of trails by motorized vehicles and other activities such as snowmobiling and XC skiing. I suspect some trails would benefit from ATV traffic and then might be utilized more by foot traffic or bikes.
Walking
[Both yes and no marked for ATV trail] Too much noise in the woods with ATVs and pollution. But people like it, so if they had their own spot...same with snow mobiles -
I don't support motorized vehicles on trails i.e. no ATV's, snow mobiles, motor bikes, etc. exception wheelchairs for handicapped access where feasible.

4. How important are the following recreational resources to you?

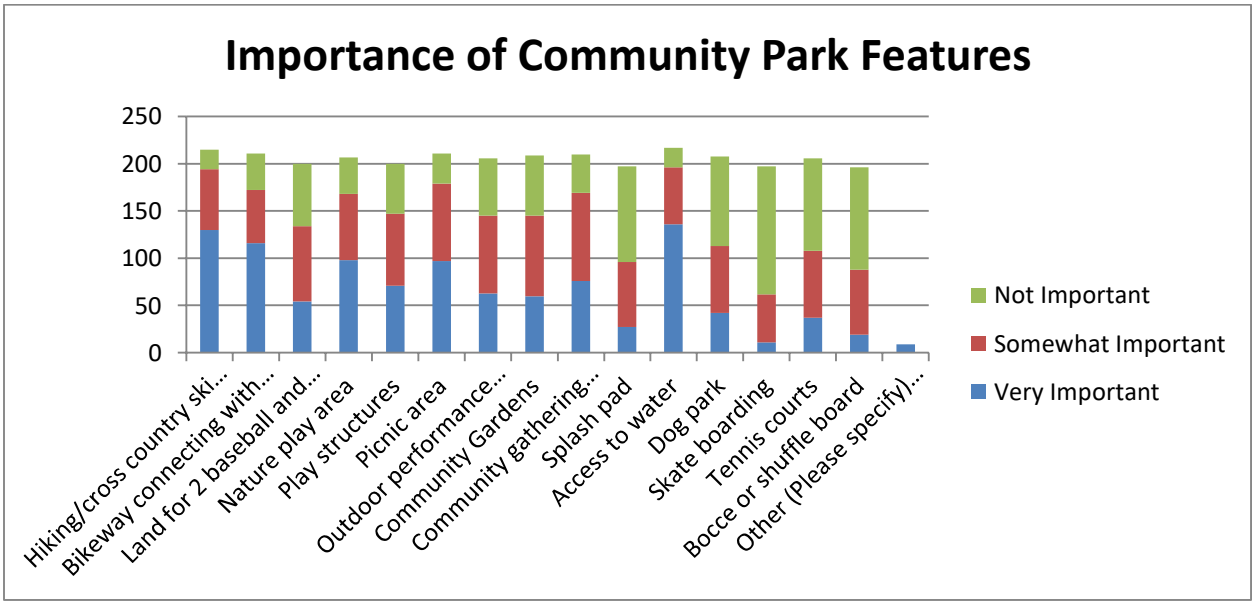
	Very Important	Somewhat Important	Not Important
Bike trails	82	89	43
Children's play areas	98	70	41
Cross Country Skiing/Snowshoeing	92	91	33
Dog park	48	73	89
Hiking trails	168	44	8
Horseback riding trails	24	76	98
Ice skating	38	89	74
Neighborhood parks	90	85	37
Picnic areas	85	86	47
Playing fields	91	70	45
Public access to natural areas	182	29	9
Public access to waterbodies	172	37	6
Public swimming pool	94	64	52
Roller blading and skate boarding	15	57	124
Soccer fields	56	78	68



4. Recreational Resources: Other resources, or comments
Basketball court, canoeing, kayaking.
Some things important for the town to have, but not to me personally.
Baseball and softball fields.
Promote more business to town.
Crag Mt -would like to see that it is always available through trails
I don't have kids, and feel that it is important to ensure good recreational resources and opportunities for children and families, but answered based on my usage.
**This respondent tried to say that he/she supports recreational resources that may not be important to him/her…
"I wouldn't use some of these but support them for others and feel they are important to town.
"It would be so beneficial to the town to have a swimming pool like we used to have at the golf course. Many people were so disappointed when this was closed. A group of us parents and kids would frequent the pool at least 3 x 5 times per week in the summers. We were fortunate to have had this while our kids were growing up. Something similar to the Vernon rec area would be so wonderful for families."
The more outdoor recreational resources, the better
Public swimming pool *****
Though we aren't "young", we support outdoor activities that attract the younger generation.
childrens play areas need to be respectful of natural environment. Walking, not parking access to

natural areas and waterbodies.
I was confused by this section so I answered very important to those activities that I value perseronally. But I feel everyone of these activities are important to have in a community. So, I don't have children who would play on a playground, but I would support a playground.
atv & snowmobile trails are very important
freedom from noise and light pollution
Public pool is super important!
Kayaking and Canoeing, Very Important
Miss the NF pool terribly! It was a wonderful place to cool off, exercise, take water aerobic lessons, place for all -kids - teens - adults - seniors.
We need ohrv trail access.
I wish there were more places (large water bodies) to swim
Communty garden area
The Town needs a pool
Town marina & docks
Fitness trail for adults/seniors and welcoming to youth.
Pool!!!!!
Would prefer that areas for team sports be located on/near school grounds with adult access when not in use by students. This would seem to be more efficient and require less energy use to mow.

5. Northfield Community Park priority list.			
Please indicate how important these features of a potential Northfield Community Park are to you			
	Very Important	Somewhat Important	Not Important
Hiking/cross country ski trails	130	64	21
Bikeway connecting with replacement for Schell Bridge	116	56	39
Land for 2 baseball and 1 softball and 2 soccer fields	54	80	66
Nature play area	98	70	39
Play structures	71	76	53
Picnic area	97	82	32
Outdoor performance stage	63	82	61
Community Gardens	60	85	64
Community gathering building	76	93	41
Splash pad	27	69	101
Access to water	136	60	21
Dog park	42	71	95
Skate boarding	11	51	135
Tennis courts	37	71	98
Bocce or shuffle board	19	69	108
Other (Please specify) _____	9	0	0

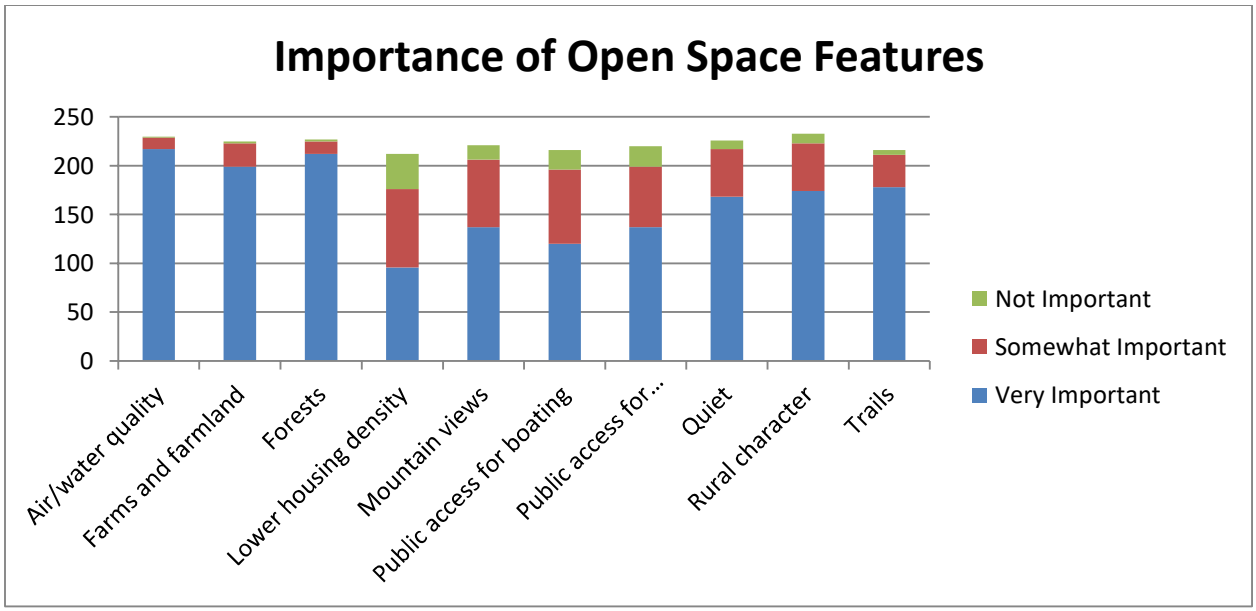


5. Community Park: Other (please specify)
Not at town expense.
Access to water potentially important, but not at present.
Volleyball court very important.
Town swimming pool very important.
Not plastic play structures.
Public bathrooms very important.
outdoor farmers mkt/craft fair/tag sale area
wheelchair accessibility; kiosk with historical info on Northfield
didn't know what a nature play area is or a splash pad; thinks water creates liability; tennis, skate boarding and bocce "would be good but not essential."
Community Gathering Bldg ought to be a Senior Center and while dog park is very important respopndent also wants a stiff leash law
Basketball court
Bike way to Schell bridge very important. ***
Play structure with swings
Community gath building: important but does not have to be in park
Tennis courts connected to community gathering building.
Yes, please replace bridge!
Town swimming, rec area!
Grills in picnic area
Play structure: some at school but can't use during day.
Dog park: big need
Gas station
Horseback riding trails
Horseshoe Courts. Space/ equipment rental for croquet, kite flying, mini-"ropes" course.

Sidewalk path for trikes, miles or "steps" markers for walking exercise.
Stocked Trout Stream. Ornamental trees and shrubs along Main Street sidewalk. Benches along Main St. sidewalk.
Affordable golf option for Northfield residents
Gun range/ Target
Public Swimming Pool
atv and snowmobile use on the new schell bridge
I'd rather see nature play areas for kids as opposed to regular play sets that seem expensive and get outdated. The high school athletic fields should get improved and the public could use them after school hours (an updated track is especially needed). We already have tennis courts and kids go to turners to skateboard.
I would love a community park with a splash pad, pool, picnic and BBQing area, soccer & baseball fields, along with trails (maybe some paved and some not - for biking, hiking, etc). What a wonderful idea! A community gathering building would really seal the deal!
Lots of trees and shade.
We miss the community pool.
play structures for small children
Swimming pool.
A public pool and a public community building would be such great additions to this town!
I don't actually think the town should be spending money on a community park.
The skateboarding not important button is also not working.
bocce court would be amazing!!!!
Leaving natural features intact and not disturbing wetlands
[nothing checked for 'play structures' but note saying "for all ages" on the side]
swimming pool
I think we have a lot of great trails already. Trails are super improtant to me, but maybe what's more important is park access to existing trails. Maybe other attractions at a park would be helpful to encouraging others to make better use of trails already in existance
Fenced in area for dogs to play off leash
Respondent emphasized need for Bikeway connecting with new Schell Bridge!
Historical Markers

6. In your opinion, how important are the following open space features to Northfield?			
	Very Important	Somewhat Important	Not Important
Air/water quality	217	12	1
Farms and farmland	199	24	2
Forests	212	13	2
Lower housing density	96	80	36
Mountain views	137	69	15
Public access for boating	120	76	20
Public access for swimming	137	62	21
Quiet	168	49	9

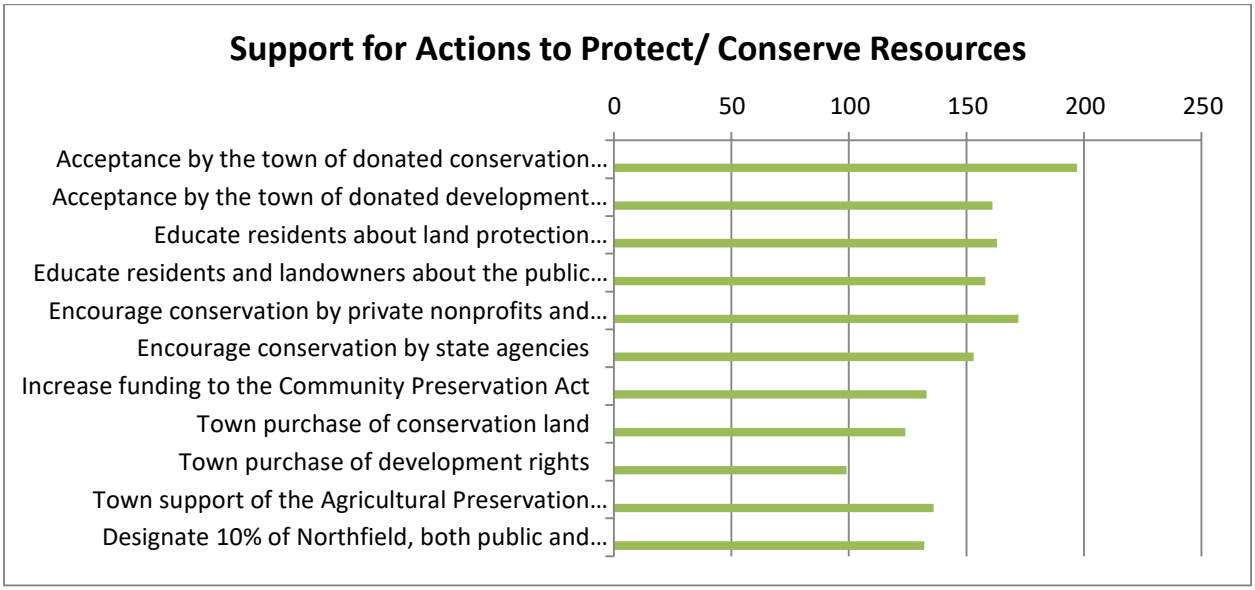
Rural character	174	49	10
Trails	178	33	5



6. Open Space Features: Other features, or comments
This town needs one or two gas stations !!
Potentially public access to boating is important.
Promote more business to town.
This is a wonderful town to live in! Especially because of the open space and natural/agricultural character
Climate change will push people inward from the coasts. Tather than trying to deflect them, Northfield should plan for welcoming more and more diverse people in a way that maintains the beauty and environmental health of the area.
Maintain dark skies as much as possible through exterior lighting education and regulation
"Rural Character" & "Lower Housing Density" often directly conflict with open space/rec conservation & ecological values/services.
We need a public park. Separately we need a community center/senior center in central location easily accessible day and night.
“Places, open spaces and parks that bring our community together. Where we run into our friend and meet new ones. I loved the idea of an outdoor performance stage and sorely miss the swimming pool.”
I wish local businesses (gravel pit) were quieter and pump ????.
We have no access for public swimming access.
Indoor pool with swim lessons.
These need not be at every "park" or public space, but they are all important.
Dark skies
Most of the biking, skiing, and hiking trails in Northfield are hilly. It would be nice if we could

develop some longer, fairly flat trails so that seniors could enjoy being in nature without needing to work harder than they are able to.
Water quality
Most conventional farms, while pretty to look at, are industrial land use and a serious source of pollution.
Opening a public access atv trail system spanning local towns has the potential to bring in a lot of revenue as it would be the only one in the state.
fishing spots highlighted
I am very concerned that much of natural resources and open space in private hands is threatened in Northfield
we need higher not lower housing density, it should just be placed properly (on existing infrastructure).
Very important to leave forests intact.
Lower housing density spreads houses over more land, eventually resulting in less open space, and turns an a town from rural to exurbia. Concentrating housing in villages makes for more open space. Witness Belchertown, which over the past 30-40 years has had huge tracts of open space destroyed by rural low-density development, and is now coming close to build-out.
Question about housing density is poorly worded. High housing density in certain small zoned areas is fine, but surburban sprawl over our open areas is not. We need public access for swimming. Rural character of the town is extremely important as are its walking and hiking trails and quiet roads.
Mostly residential, few businesses; Rejection of building a pipe line; Rejection of marijuana business of any kind; Northfield Mt. Hermon campus being kept as a campus (now Thomas Aquinas), never sold for development
I think the key is linking all the assets and having a visitor center (central info point)
Some cluster housing near the Village Center would provide support and social interaction for age 55 & over and create demand for services and retail revitalizing the center. Eye doctor, dentist, pub, restaurant, stationery store/copy center would complement Library and churches.

7. Which of the following actions do you support to protect/conserve resources in Northfield?	
	support
Acceptance by the town of donated conservation land	197
Acceptance by the town of donated development rights (conservation restriction)	161
Educate residents about land protection opportunities and estate planning	163
Educate residents and landowners about the public service costs associated with land uses	158
Encourage conservation by private nonprofits and land trusts	172
Encourage conservation by state agencies	153
Increase funding to the Community Preservation Act	133
Town purchase of conservation land	124
Town purchase of development rights	99
Town support of the Agricultural Preservation Restriction (APR) Program	136
Designate 10% of Northfield, both public and private, as “forever wild”?	132



7. Conservation Actions: Other actions, or comments
Promote more business to town.
Do not support removing more land from real estate tax.
I do appreciate open space, but at the same time we can't keep taking land and preventing growth from our town.
NO on increased funding for the Community Preservation Act - what does this have to do with open space?
More education of public regarding the last 4 actions (town purchase of cones action land and development rights, support of APR, 10% of Northfield "forever wild").
No more money - taxes too high.
I would like Northfield to not create restrictions that unnecessarily hamper businesses operating here.
I do not want any more land coming off the town tax roll. When one owns land and makes sacrifices in order to take care of it, paying the taxes faithfully, owners should be able to do what they like with their own land - and be able to pass it on to their children and future generations without the town imposing restrictions on them !!!
DCR will provide programming for free (with reference to the two actions to educate residents.
"NO"c to question about increased funding for CPA
You will never get businesses in this town with this mindset. People want lower taxes. Not for our town to be more anti business than these committees already are
Development for town fire station.
I think 10% "Forever Wild" seems overly modest for such a rural town.
Acceptance of town of donated development rts "assume this means regulating development"
10% wild lands "not sure what this is"
"100% on board with all of this"
"50% or more forever wild"
Need to know more about conservation restriction.

Not sure what all of this entail, but they sound good.
No CPA increase
I would guess "forever wild" would need to not be isolated areas with development all around… so some connecting points would help make the areas livable for wildlife.
Probably support more. Need to educate myself.
Not sure I know enough about all of these, but I generally support conservation efforts.
Educate new Northfield residents about the importance of trail systems and the knowledge of such that may pass through their property.
Im not sure i understand the question. I support keeping areas safe and wild and less building. I support preservation a d education and a balance of using the land in a respectful way to keep it for years to come.
Just 10% forever wild? Could be more
Opening trail systems to atvs and other ohrv
Town purchase seems like a cost we might not be able to afford - but when land is gone - it is gone.
Develop both tax base areas of development that dont compromise town character and keep the rural overall. Town owned areas take tax money for maintenance, good to keep in mind.
More taxable use land
I don't feel educated enough about this to say
I am particularly concerned about the fate of the land at the top of Gulf Road where the pipeline compressor station had been planned
Education is the key to involving residents
More info needed re: the implications of deeming land protected, "Forever Wild", etc. Also, not sure that conservation by state agencies would make a difference (eg. pipeline run through state forest in Berkshires)
Did not check last box: wrote "no it should be more than 10%"
An increase to the CPA is so important!
Need further information to support things like "forever wild"
Keep new business development out Main St.; Thomas Aquinas property as a campus
by support, do you mean me personally or me supportive of Open Space action?
[emphasis on increase to CPA]
Question mark next to "Town purchase of development rights"
Sounds awesome [Question marks by CPA increase and Town purchase of development rights]
Respondent wrote "NO!" next to Increase funding of CPA
This is a great topic for public discussion and policy direction. How much open space do we have, which scenic views should be protected, how much is watershed, where is watershed most vulnerable. I don't have enough data to form an opinion. Team up with Transition Northfield sessions on "Future of Northfield."

8. Are there specific areas in Northfield that the town should try to own, protect access to, or otherwise protect?	
yes	86
no	69

8. Areas to protect: if you answered "yes", which areas are priorities for you?
Old Wendell Rd, access reservoir Birch Point.
Probably, yet I don't know of any. But keep out the chains - Dollar Stores, etc.
Wish list: Find a way to reduce the number of tractor trailer rigs that roll thru town.
West Northfield playground area.
Hills in east Northfield.
Hunters on hunting season; I think some places should not allow hunting due to safety and the decrease of wildlife habitat.
Someplace to create a town beach.
Not sure how this would work, but Main Street is important to the character of the town and we are already at a disadvantage with a busy highway cutting through; preserving as much "character" as possible is important.
Protect river front and discourage ridge line housing development.
Brush Mountain.
Promote more business to town.
Mill Brook pond, north of Library. I would like to see it rebuilt into a swimming area for Town residents only
perhaps more river/untasked protections? If the college tries to sell undeveloped land with trails along Louisiana Brook, this would be an important parcel to consider
Crag Mountain and similar places (trails in forests with elevation changes) or river access for canoes and kayaks
Didn't understand the question
The land surrounding NMH/St. Thomas Aquinas, Bennett Meadow
CT River & tributary Riverfront Protection Buffers, Wetlands
Protect land owned by northeast Utilities - very important to conserve
West Northfield, West Northfield wetlands
Northfield state forest above the ridge
Areas along river, forest areas including mountains, farmland.
"The end of the cul-de-sac on Old Elm way has been for sale for a long time. It is not selling and shouldn't sell. It is partial wetland and should be protected. If we had known the wetland status of our parcel on Old Elm Way, we wouldn't have purchased it and built on it. It should have been protected."
Border with Erving. Access to river.
We need a better boat ramp.
Any part of Pulpit Falls that is owned by Town of Northfield
Anything that you can to open public access to land, water, swimming.
Wanamaker Pond - dredge for swimming.
Schell bridge access
Area of woods, water. Winchester Rd, Pearson Rd., rt. 10 perimeter (?).
River access
Farmland - try for more organic land. Land by river, historical sites and forests. Everything!
Crag Mt. Millbrook area

Northfield wetlands
I'll leave that to the committee--probably yes, but I'm not sure of current ownership or plans for uses.
King Phillips Hill arrea; river frontage on both sides of the river.
The waterfront around Schell Bridge. Crag Mt.
Water/ Forest areas with trails.
Land along the Connecticut River beyond the electric company riverbank. It would be great to have a trail along the river. No development. Rt 142 should be protected from any structures that would obscure the views. All remaining farmpland should be protected. The Mill Brook area should be protected.
Protect Gulf Rd. from Large Truck Traffic- Post Trail X signs. Make Main St. back from State DOT and set speed limit to 20 mph and post "No Trucks Allowed". Designate a business zone away from center.
Wild places, forests
Tracts considered for pipeline use, farmland being covered with housing developments, wildlife/mountain areas being deforested.
Water access
The seasonal snowmobile trail that crosses the rt.10 bridge connecting the gill/bernardston snowmobile trail system to Northfield.
Wetland areas
Land access to trails and swimming facilities
nature area behind library
The lot at the southern end of town now owned by a church which was formerly a gas station, as it would be a great welcome center location now, and it has historic value too
South Mountain Ridge—it is a contiguous chunk of forest with logging pressure.
Grandin Reservoir and surrounding woods relevant to the East Northfield Water Company
along the CT river and various waterways
Protect would be important
Ridges and river access, community garden sites
I would like to see access restored to the former Metacomet-Monadnock Trail (e.g. on Crag Mountain), so that the trail goes through the woods instead of on roads.
Not sure where though, but maintaining the rural character is what makes northfield very special. Farms and opportunity for local food is and will be very important. Maybe farmland could be purchased by the town and leased to young farmers. Maybe Mt Grace could weigh in on conservation suggestions...Remember, when land is gone, it is gone. A few new houses each each year really only brings in about $3-5,000. In taxes. It really doesn't change our town budget that much. Leasing land might bring in a smaller amount but clearly maintains the insures the continuation of our rural character.
The field on Pierson Road. The Moody Center/TA College fields along WInchester Rd.
mill river area close to village. protect natural areas close to pop density
The land in the area where the compressor station had been planned. This land was for sale for quite a while in 2018 and 2019. It would have been in the town's best interest to acquire it, especially after what almost happened there, and what could still happen in the future. I sincerely hope the town would try to work with any land trusts or other organizations or agencies if this particular opportunity arises again as this area is extremely vulnerable.
Former Northfield Mount Hermon campus - property currently owned by Moody Center
Connecticut River Swimming access point

Protection of watershed areas is probably my primary concern.
area behind library (not sure of name)
Forested areas in general
Wetland bounded by Birnam Rd., Pine St., Highland Ave. and Glenwood St.; River and stream frontage (Connecticut River and other smaller streams)
Any area adjacent to the Schell Bridge or with river access; buffers to brooks and streams.
preserve current wild areas and farms
Any current natural recreation areas
Land with native significance
Protect the town with strong laws on lot size and frontage outside of main village.
Any land or property that would be bought by corporate or franchise.
[entered incorrectly - there was no answer registered on question 10 in this questionnaire.]
watersheds for East Northfield and Northfield
All forested areas
Northfield Mountain and historical sites
Land at ALexander Hill from Jerry Nelson and Barbara and Sam Richardson (if/when they are ready to sell).
South mountain ridge line, preserve wildlife habitat, limit further tree clearing
Crag Mountain
CT river, other natural water sources, forest
CT river, other natural water sources, forest
Mill Brook Wetland Area; Schell Bridge Area; All Farmland along the river
Agricultural land, open space, college
Craig Mtn - and the Ridge
The Schell Bridge replacement will be key to linking East and West and connecting with the River for non-boating people.
1) Former Mobil station lot - great spot for welcome center 2) Land between boat ramp and Schell Bridge for park and swimming
Farmland/Open Space/Forests
Schell Bridge Area
Connecticut River Areas
The forest lands between Northfield & Warwick & Erving. Lands along the river.
Partner [on or with?] 24 Main St for Visitor's Center in conjunction with Hist Comm and private non profits - NATBA and Franklin Cty Chamber
all currently identified areas - look what happened with pipeline threats.

13. Please provide any additional comments
Steam engines per TEA (??)
Promote more business to town.
Need a gas station.
Thanks for all your great work! I work for DCR as a Universal Access Program Coordinator, a potential resource if ever needed.
Please be a pro-business community.
Thank you all for this important work! Building community through the thoughtful and

appropriate use of our beautiful local environment is important, especially in these troubling times.
We have enough regulation by the State and Federal gov. I don't think additional restrictions by the town is healthy or warranted.
I would really like to see a publicly available trail map for the Northfield State Forest parcel around Notch Mt, between School St/Warwick Rd. A town-wide trail map would be fantastic. When is the community meeting??
Dark skies and quiet are priorities for me. Fight light and noise pollution.
"We must have better sports fields and a town meeting spot for concerts, functions, picnics."
"Love this town and it's quality, open space, varied land use, and residents. Would love to see a Northfield community park! Great idea to connect with new Schell Bridge. A visitors' center? Also the town is loaded with history (Kids could benefit a place for Recreation Commission to work out of). Thank you for trying to better Northfield and appreciate given opportunity for input!" Stacy Bond. stacyelizabethbond@yahoo.com.
Communication difficult between townspeople - no more newspaper. Not all on Next Door. Not all get Recorder.
From Jim Rice.: not interested in filling out survey. Simply put, money for recreation should come from donations or fees from those involved. My real estate bill is crippling, and no more needs to be spent. We have lots of trails in Northfield already as well as public land. Every time land becomes public, the tax burden increases on the neighbors."
"I love biking so that is super important to me. I must travel to swim laps - would love to have access through NMH or St. Thomas Aquinas College. I have started a community flower garden at intersection of Old Wendell Rd, Lyman Rd, and New Plain rd." Jan Herlihy janherlihy@gmail.com
Elderly, fixed income, no raise for 3 years. No more taxes
Thank you for caring!
We are a young, professional family. We are seriously considering moving. There are many positive things at this community, but we find ourselves accessing community in other places. Thanks for doing this survey.
Light Pollution is an increasing problem in Northfield. The orange glow is destroying the night skies (and my sleep).
Need to support E-W high speed rail: Boston-Greenfield-North Adams not Boston-Worcester-Pittsfield.
New to town.
None; at this time.
I am NOT opposed to Business or a gas station in town (downtown). Also stickers for the dump instead of buying bags.
No recreational restrictions for schell!
I would love to see more swimming opportunities nearby!
Please consider a community pool :).
I am an Outdoor Leadership Program graduate from GCC and appreciate your work for the town, it's residents and natural areas.
Wondering if seniors might like a safe walking opportunity at the high school - indoors - December through March for exercise during the school day but not when classes change, or after school...and maybe a coffee time afterwards.
The impact of the campground planned for Pierson Road will have tragic impacts to the character and composition of the community. It's horrific that the town could not or would not prevent its construction.

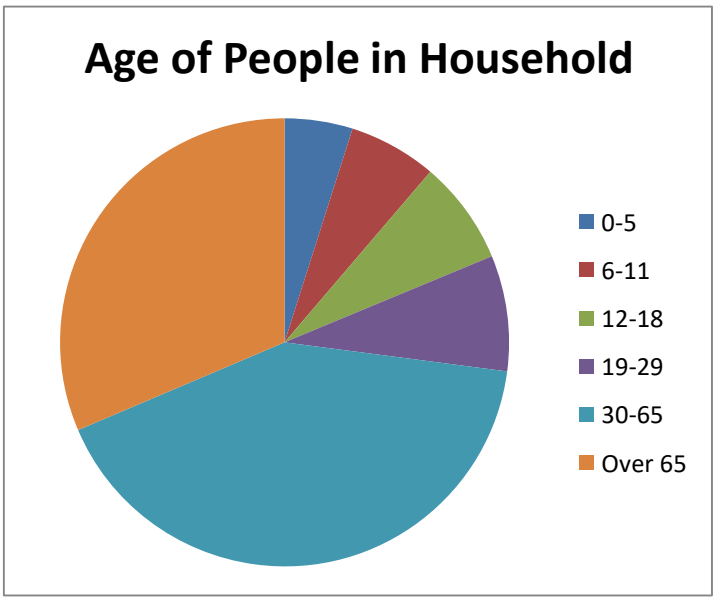
thanks for your work on this
I remain very concerned about protecting the Millers Brook watershed. This whole watershed is priority habitat and steep, highly erodible land. Protecting this fragile and vulnerable watershed should be a high priority for the town, especially considering what almost happened with the pipeline compressor station. I am extremely concerned because much of the land which is in private hands is very vulnerable to development, damage from logging, road work, and other activities which are adversely impacting it.
I am concerned about the direction of the Town of Northfield
There needs to be a balance between industry, commerce and recreation in this town. There is no reason we cannot preserve the historical and recreational aspects of Northfield while at the same time creating opportunities for new Business (even on main street). It is absolutely confounding that people here rallied to support the revitalization of an old bridge for bicycle use (now building a brand new one, only for bicycle use), but we have been unsuccessful at enticing new Business (or even a gas station) to build here and help share the cost of vital infrastructure. I appreciate the survey on open space but if you have plans to add additional expense before you bring in some Business to help cover our existing expenses, you are sinking our ship. I am referring to real income when I say Business, I do not mean a bicyclist riding through town and buying a bottle of water at Mims. This town has current and future infrastructure concerns that equate to millions of dollars, we can hold off on a park until that is resolved.
We are forever looking for natural places to swim and often travel far to find them.
I might support preservation for certain values (e.g. endangered or threatened species) for which I feel the Town should cede to agencies/entities better equipped to assume responsibility. (i.e. Focus on what we can do most effectively with limited resources.)
We need a pool!
Thank you.
Thanks to all who work so hard to make and maintain our trail systems in town! Updated maps would be good. A public Swimming place would be great.
Strengthen tax base, keep most of town the rural way it is. Encourage small business.
I look forward to hiking trails in town, now that I have time. I do miss the Town Pool, as a swimmer, and will be looking into other pools and Erving State Park (Laurel Lake) this summer. We do need business in town, so finding the proper space(s) for this without compromising the town's identity will be important. All of these aspects will make Northfield more desirable.
Thanks for doing this survey!
Protecting our water supplies is our number one priority.
We'd happily help pay for a pool!
Thanks for the great work you are doing Open Space Committee!!
Thank you for keeping Northfield beautiful. My husband and I moved here in 2018 and love hiking and mountain biking here. We wish there was a public fenced in play area to practice off leash training with our dog. Our yard is too steep and rocky to fence in. If you know of such a place, please let me know!
I think it would be nice to identify and publicize all the scenic views in Northfield. i.e. -view NW from the Moody Birthplace of the CT River and the Vermont hills -Garnet Rock, Crag Mountain, King Philip's Hill, etc.
Northfield is a beautiful community! We love living here. It's peaceful, scenic, and well maintained. The police department is vigilant - we feel safe and comfortable here.
Northfield is a beautiful community! We love living here. It's peaceful, scenic, and well maintained. The police department is vigilant - we feel safe and comfortable here.
Thank you! I think the largest challenge is "educating" citizens to what is already here and

connecting the recreation to economic development ideas.
Thank you for thinking about all of these important ways to make and keep Northfield a very special place.
I enjoy many outdoor activities on my own property such as bird watching, identifying native plants and animals, gardening. My property is used by hunters with my permission. Neighbors may walk on my property but not use motorized vehicles.
Kiwanis Park / W. Nfld Playground?
Re. telecommute question: No access to anything but dial-up internet - it's really limiting -also no cell phone service

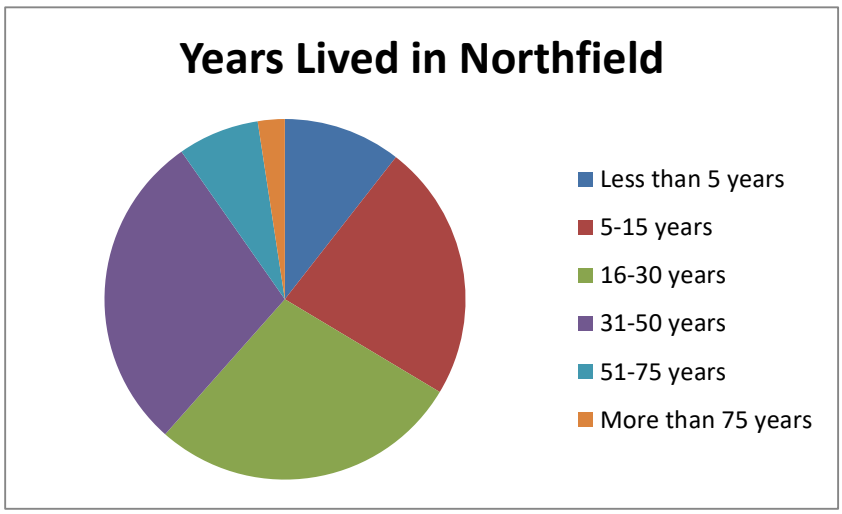
9. Which Northfield neighborhood do you live in?	
East Northfield (including the Ridge)	86
South Mountain area	32
South Northfield (the farms)	32
West Northfield	26
Village Center	53

10. Do you telecommute to work or work from home?	
yes	54
no	164

11. Ages of people in household?	
0-5	17
6-11	22
12-18	26
19-29	29
30-65	144
Over 65	109



12.Years lived in Northfield?	
Less than 5 years	26
5-15 years	57
16-30 years	69
31-50 years	71
51-75 years	18
More than 75 years	6



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Late Open Space and Recreation Survey Comments

1. Activities: Other activities, or comments
Love ice skating; want it in town
2. Trails: Other trails, or comments
Hope to use all these local trails in time
I'm new and don't yet know most of these
We've lived here in 8/17. I had no idea that the trails were there (other than Alderbrook, Franklin Co Bikeway, Northfield Mtn Rec Area). Are they on a map or brochure?
Wow- is there a map of these trails- I didn't know about most of them!
3. Trail activities: Other activities, or comments
Dogwalking if people pick up poop--signs/ bags; snomobiling if these are no CC skiing trails
many many hiking/ walking trails exist; don't waste money on bridge just for bikes- what a waste
Form by multiple family members- one says no to some while others say yes
All good ideas, esp Bicyling and Hiking
4. Recreational Resources: Other resources, or comments
playing fields and soccer fields at school are fine
5. Community Park: Other (please specify)
Snomobile across Schell Bridge replacement
[pointed out places where items on park list already exist]
6. Open Space Features: Other features, or comments
non-motorized boating access very important
7. Conservation Actions: Other actions, or comments
Don't understand acceptance of CR by town; unfamiliar with CPA; wants more than 10% forever wild
Not familiar with APR program
A map of spaces, trails, resources
8. Areas to protect: if you answered "yes", which areas are priorities for you?
Not sure- need expert guidance; certainly public water supply buffers
not sure
not sure
New Schell Bridge park
13. Please provide any additional comments
Thanks for putting this together. It's Important. 2 voters filled this out together.
I've returned after 8 years away; Had been here 22 years before I left
Need to stop saying NO to new businesses and opportunities in town. We need a nice resaurant/ bar so we don't need to leave town. We need a gas station in town. I remember when there were 5 in town.

Top Priorities: groomed ice skating outdoors (w easy access to info on when it is open and skatable); groomed cc ski trails that are low cost or free; a trail map for Northfield that shows all trails and skating and if trails a groomed for skiing.
We love this town. Came from Cape Cod which I watched become overdeveloped and destroyed since the 1960s.