Gilmanton, New Hampshire

Natural Resources Inventory II

July, 2023

Tom Howe Barn & Conservation Area Hayfield ~ Photo Courtesy of Tom Howe

Prepared by

Gilmanton Conservation Commission
PO Box 550
Gilmanton, NH 03237

DEDICATION

Gilmanton has been blessed with many citizens who have contributed greatly to the natural environmental health of this community over many years. Each has made a positive difference in the health, beauty and well-being of this community. However, two people stand out for their contributions to the long-term natural health and beauty of this place we call home. To them this Natural Resources Inventory is lovingly dedicated.

Nanci's Durrell Farm abandoned beaver pond ~ Photo Courtesy of Charlie Mitchell

Nanci Mitchell

Nanci has worked to protect land and wildlife wherever she has lived from New York to Massachusetts to New Hampshire. She has been active with Conservation Commissions and land protection efforts that began 47 years ago. Nanci has been intimately involved in the identification and protection of special lands in Gilmanton since she moved here in 2000. She chaired the Gilmanton Conservation Commission for 10 years, guiding the Commission in its work in protecting our natural resources and working to preserve those special parcels

of land and water that make Gilmanton the beautiful spot we all live in. She has worked tirelessly on mapping the natural resources of our Town, developing the first Natural Resources Inventory in 2004 that took 4 years and is continuing to assist in the production of this, the second edition of that NRI. She has worked with Soren Denlinger on updating the maps included in this document. She has faithfully attended working sessions of the Conservation Commission to review our work and make extremely helpful suggestions for additions (and a few deletions) to this NRI, helping to refine and enhance the information we have tried to provide the community through that work.

Nanci was a founding member and treasurer of the Belknap Range Conservation Coalition. Amanda Stone, neighbor and conservation associate, describes Nanci as a "quiet leader". "*When Nanci volunteers for you, you have the best volunteer in Town."* She is unassuming, very humble and uncomfortable in the spotlight. Together Nanci and her husband, Charlie, conserved their land, adding to it over the years, and helped create an unfragmented block of 8,898 protected acres, with trails for the public. We look on Nanci as our mentor, a vital resource of knowledge of the natural community, but, most of all, as a cherished friend to us all. We are deeply grateful for her presence and her willingness to cheerfully share her time and knowledge with us.

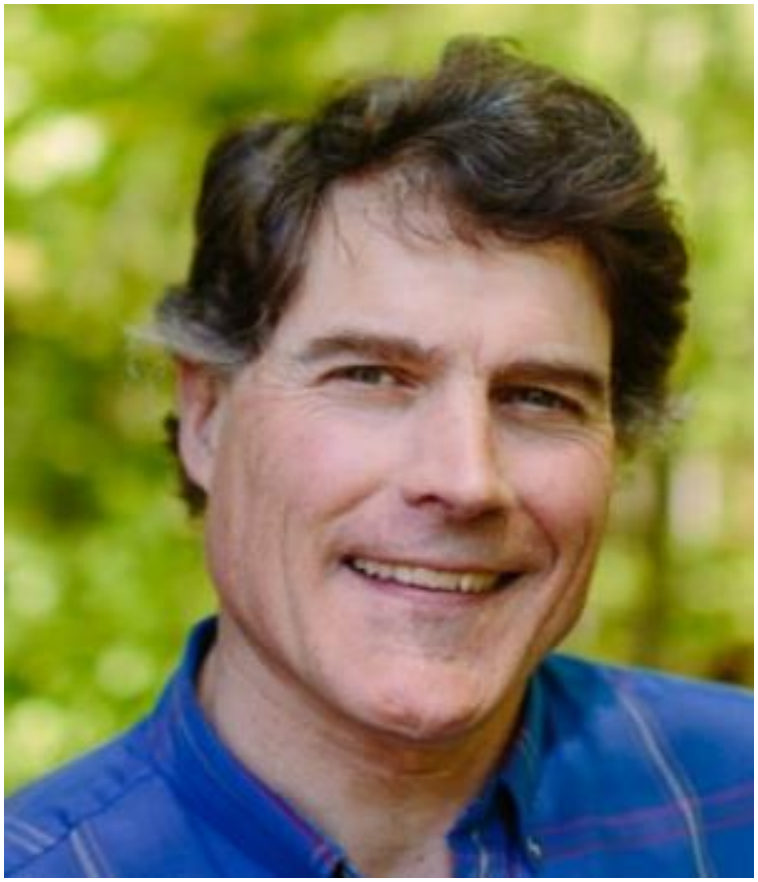


Photo courtesy of Emily Lord, SPNHF

Tom Howe

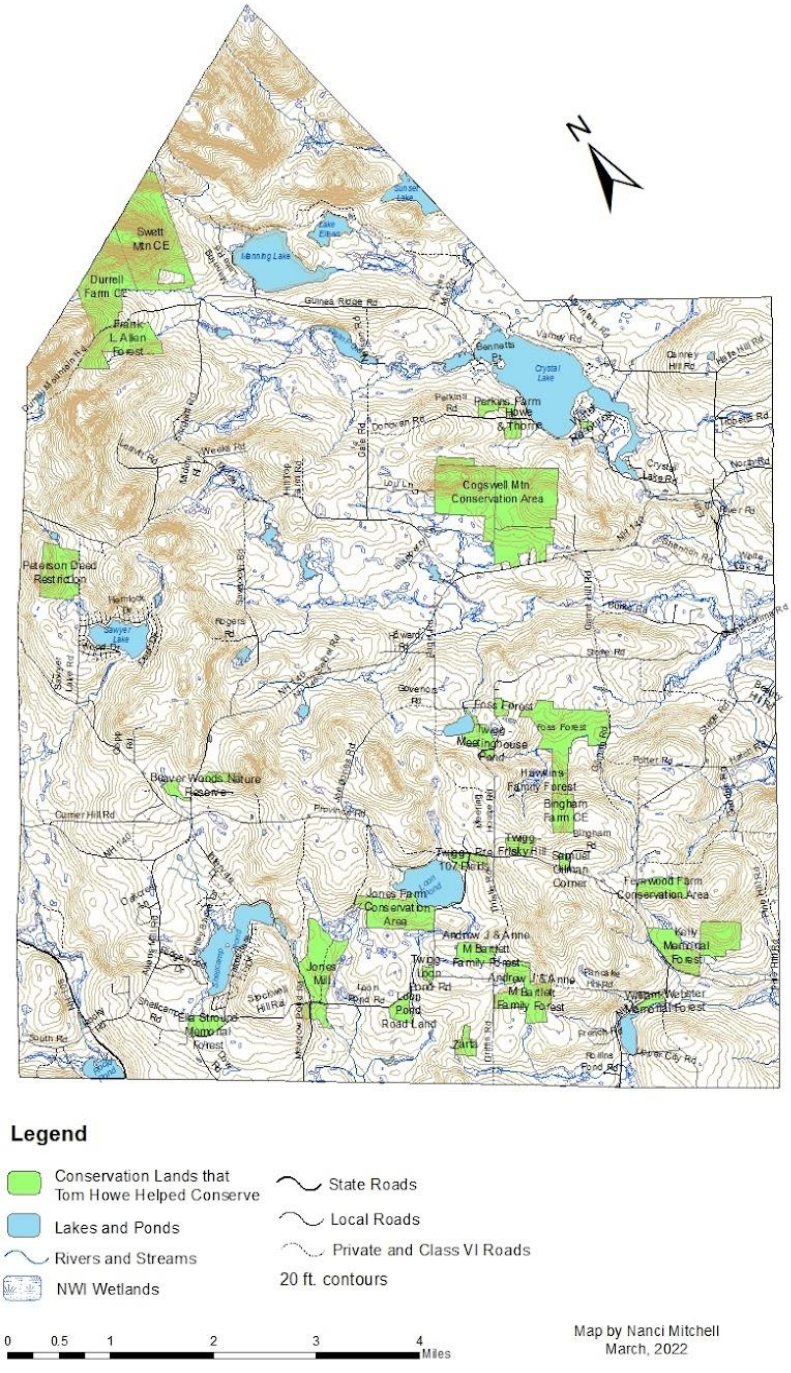
"Tom worked for 10 years at the Lakes Region Conservation Trust as their first Executive Director. He then moved to the Society for the Protection of New Hampshire Forests where he worked for 24 years, most recently as Senior Director of Land Conservation. His colleagues remember him for training and mentoring many young land conservationists throughout the state and across the country. Tom delighted in conserving trails, trout streams, mountain sides, urban farms, and rich habitat throughout the state to sustain its people. Tom was a founding and active member of the Gilmanton Land Trust and the Belknap Range Conservation Coalition. There are few places in New Hampshire where one can travel without passing a property he helped protect or a landowner he befriended. His needs were simple. He had a huge heart, a gentle kindness, and an attentiveness to all those who crossed his path. His greatest passion was for his family. Tom lived fully, selflessly, compassionately, and inquisitively, and he was admired by nearly everyone he met." ~ *Jack Savage, President of Society for the Protection of New Hampshire Forests provided the above.*

Tom made a huge impact on conservation in Gilmanton where he worked diligently to develop conservation easements on important natural properties and helped conserve 28 parcels in Town (see below). He knew how to work with all kinds of people to help them protect their lands as they wanted them protected. He was involved in so many aspects of the life of the

Gilmanton community and beyond. To us, Tom was the very embodiment of what it means to be a "citizen". He cared so much for us, and for this place we all call home. We are indeed fortunate to have had his caring, his grace, and his friendship. Tom's passion for the land shone right through him and it was reflected in his brilliant smile and sparkling eyes. We will always miss his sense of humor. His spirit will always reside in Gilmanton and we will look back on his life and work with deep pride and appreciation for having known him and having benefited from his life's work.

For all of these reasons, and so much more, we gratefully dedicate this latest edition of the Natural Resources Inventory to Nanci Mitchell and Tom Howe.

Tom Howe's Many Contributions to Land Conservation in Gilmanton, NH



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1.0 Introduction

Some of Gilmanton's Natural Features from Frisky Hill ~ Photo Courtesy of Thomie Dombrowski

What are the natural features which make a township handsome? A river, with its waterfalls and meadows, a lake, a hill, a cliff or individual rocks, a forest and ancient trees standing singly. Such things are beautiful; they have a high use which dollars and cents never represent. If the inhabitants of a town were wise, they would seek to reserve these things, though at a considerable expense; for such things educate far more than any hired teachers or preachers, or any at present recognized system of school education.

~Henry David Thoreau, Journal

Gilmanton is a large, rural town with a population of 3,994 at the state census across 38,127 acres in central New Hampshire. It is located in Belknap County, south of Lake Winnipesaukee. Its diverse topography, in combination with the many lakes, streams, forests, and farms provides a high quality of life for Gilmanton residents and excellent habitat for native plants and animals.

This natural resource inventory is a description and analysis of the significant natural resources found in the town of Gilmanton. It covers water, wildlife, forest, natural communities, agricultural, and soil resources. It also lists lands in Gilmanton that have been permanently conserved to protect their natural resources for the benefit of future generations.

This information is intended to be a resource for landowners, town officials, and citizens who are the long-term stewards of Gilmanton's natural resources. Specifically, it can be used to:

- Educate and promote awareness about Gilmanton's natural resources;
- Document current conditions so changes over time can be assessed;
- Develop land conservation priorities and a plan for Gilmanton;
- Provide a basis for master planning, ordinance revisions and planning decisions.[1]

[1]Stone, Amanda J.L., *Natural Resources Inventories, a Guide for New Hampshire Communities and Conservation Groups,* UNH Cooperative Extension, Durham, NH, 2001.

According to the 2020 United States census, New Hampshire's population grew by 4.6% to 1,377,529. Gilmanton, along with the other towns in the state, must accept the challenge of conserving significant resources in the face of increasing development and population pressures. This report should provide the community with a sound foundation upon which land use decisions can be based.

A Natural Resources Inventory is never "finished" as the availability of new data and new mapping capabilities make it necessary to update the inventory periodically. The information contained in the updated inventory reflects the updated, digitized soils maps for Belknap County, most recently updated in 2019. In addition, the information contained in this report is now more useful to community decision makers as digitized tax parcel information is now available.

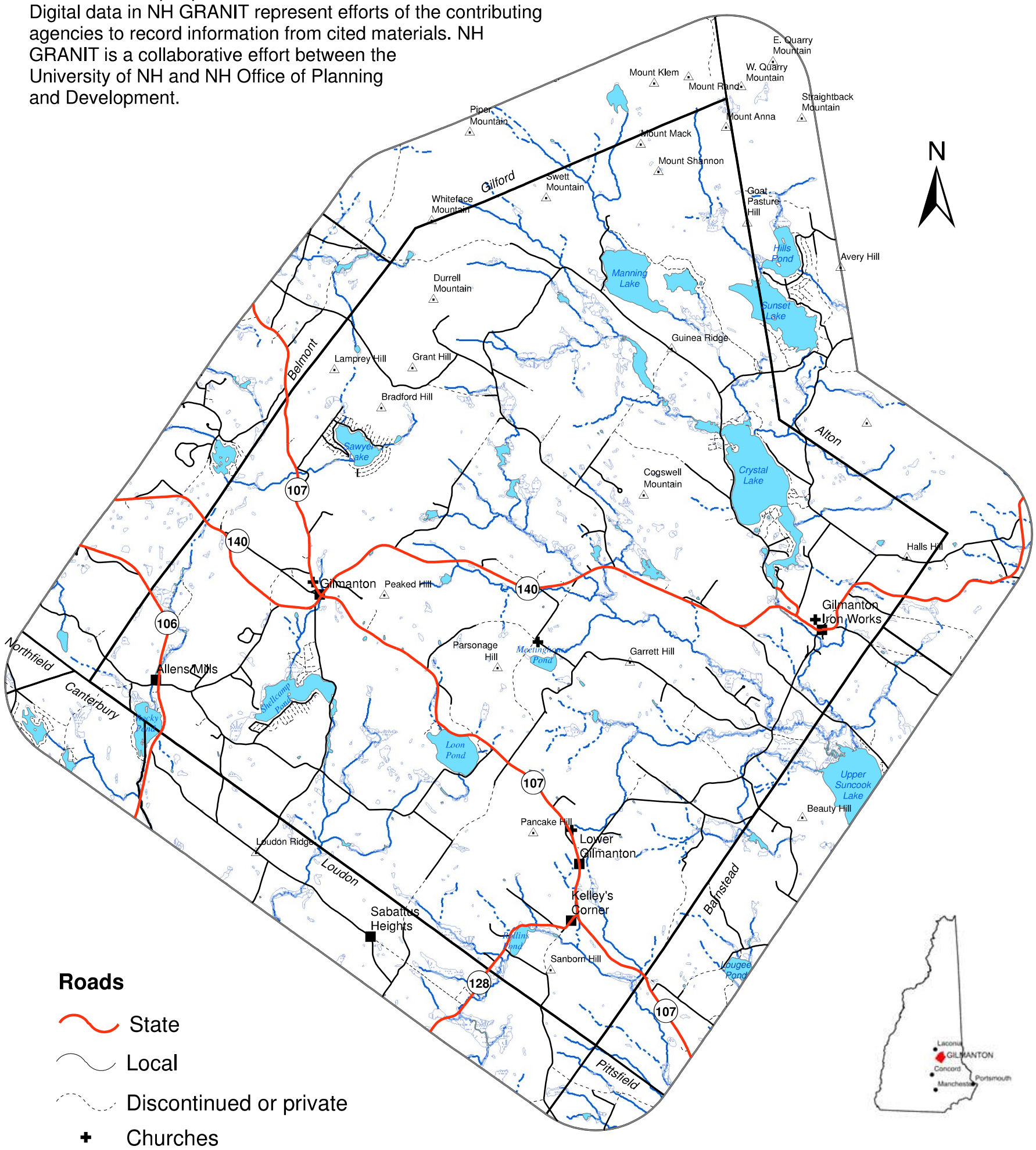
Town of Gilmanton, New Hampshire

Natural Resources Inventory

Base Map

The Base Map is a primary map for a Natural Resources Inventory. It shows the community without any additional resources. Most of the features on this map appear on other maps in this NRI.

Data on this map represents stock data sets from NH GRANIT. Digital data in NH GRANIT represent efforts of the contributing agencies to record information from cited materials. NH GRANIT is a collaborative effort between the University of NH and NH Office of Planning and Development.



Map prepared by Nanci Mitchell for the Gilmanton Conservation Commission, March 2023.

2.0 Topography

Frisky Hill view of the Belknaps ~ Photo Courtesy of Thomie Dombrowski

***"Poets make the best topographers"* ~ H.G. Hoskins, Author**

Topography is diverse and the town ranges from approximately 550 feet in elevation at Rocky Pond up to 1945 feet on Mt. Mack in the Belknap Mountains. In general, the terrain is more rolling near the Loudon Town line and more rugged closer to the Belknap Mountain range in the northern portion of the Town. The Topography Map is a map showing topography in shades of green and steep slopes in shades of red. The rolling terrain near the Loudon town line can be seen visually as the contour lines are further apart. Similarly, the contour lines are closer together in the more rugged and steep areas of the Belknap Mountain Range. This map shows a continuous corridor of higher elevation land stretching from Pancake Hill in the southeast, to Frisky Hill, to Peaked Hill, and to Grant Hill. This series of high elevation lands continues into the Belknaps and includes Durrell Mountain, Whiteface Mountain, Swett Mountain and Mount Mack. These lands make a significant contribution to many of the scenic views in the Town. Approximately 45% of Gilmanton is over 900 feet in elevation.

2.1 Steep Slopes

Slopes in excess of 25% should not be built upon especially where soils are thin or highly erodible. In addition, road access is very difficult where slopes are so steep. Most of Gilmanton's steepest slopes are located near mountain peaks and along the sides of ridges, with the highest frequency near the Belknap Mountains in the northern end of the Town. These slopes are shown on the Topography Map and on the Constraints Map. The Constraints Map shows areas of the Town that are not appropriate for development. In addition to steep slopes, wetlands, surface waters, conservation lands and paved areas are included. Approximately 5% of the Town has slopes in excess of 25%.

Town of Gilmanton

New Hampshire

DATA SOURCES

NH GRANIT Data

Most of the data displayed here represents stock data sets obtained in 2002 from the NH GRANIT database as maintained by the Complex Systems Research Center (CSRC) at the University of New Hampshire (UNH). The New Hampshire Geographically Referenced Analysis and Information Transfer System (NH GRANIT) is a cooperative project to create, maintain, and make available a statewide geographic data base serving the information needs of state, regional, and local decision-makers. A collaborative effort between the University of New Hampshire and the NH Office of State Planning (OSP), the core GRANIT System is housed at the UNH Institute for the Study of Earth, Oceans, and Space in Durham. The GRANIT approach to a statewide GIS depends upon the cooperative efforts of a host of agencies, collaborating on various elements of database design and construction as well as application development.

NH GRANIT and CSRC maintain a continuing program to identify and correct errors in these data. CSRC, OSP, SPNHF and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

Other Data

- Conservation Lands (2/2005): Includes stock GRANIT data as well as more recent parcels digitized by The Forest Society and Lakes Region Planning Commission from various sources including town tax maps.
- Roads derived from NH DOT roads layer (5/2002) and USGS digital line graphs with assorted corrections and updates as identified by Town of Gilmanton and digitized by SPNHF.
- Streams derived from stock GRANIT streams layer (1968) with assorted corrections and updates as identified by Town of Gilmanton.
- Contours & Slopes > 25% derived from USGS National Elevation Data DEM (10 meter cell size).
- Developed Lands derived from the developed classes of the 2001 NH Landcover (100, 140). Road rights-of-way derived by applying the following buffers to road centerlines: 100' to routes 140 & 106, 50' to routes 107 & 129, and 25' to all other roads excluding class VI roads and trails.
- Wetlands constraint is a composite of non-lacustrine NWI wetlands classes and USGS wetlands.
- Surface waters constraint derived from the USGS Lake or Pond, River or Stream classes.
- High Value Natural Resource Areas derived by the Forest Society from multiple natural resource datalayers. Represents the 25% of Gilmanton with the highest natural resource co-occurrence values.

Map Disclaimer

This map was produced for the Gilmanton Conservation Commission and is intended to be used for planning purposes only. Representations of property lines on this map are one interpretation of available data and should not be construed as binding or conclusive evidence of ownership.

KEY

Point Features
- Cemetery
- Church
- Village / Settlement
- Camp

Political Boundaries
- Neighboring Town Lines
- Gilmanton Town Line

Roads
- Major State Roads
- Local Roads
- Other Minor or Class VI Rds
- Trails

Hydrography
- Watershed Boundaries (HUC 12)
- Streams
- Intermittent Streams

Topography
- Summit or Ridge
- Contour Lines - 200' interval
- Contour Lines - 40' interval

Constraints to Development
- Slopes > 25%
- Road Rights of Way / Developed Lands
- Wetlands
- Surface Waters
- Conservation Lands

High Value Natural Resource Areas*
- Co-occurrence Values >= 4

** the 25% of Gilmanton with the highest co-occurrence values*

CONSTRAINTS COMPOSITE

- Developed Lands & Road Rights-of-Way
- Conservation Lands
- Wetlands
- Surface Water Bodies
- Steep Slopes > 25%

ACKNOWLEDGEMENT

This map is one of a series of maps produced as part of a comprehensive natural resource inventory for the Town of Gilmanton. The project was a joint effort of the Gilmanton Conservation Commission and The Society for the Protection of New Hampshire Forests with assistance provided by Blue Moon Environmental, Inc. and Gilmanton School. We are grateful for the expertise and time of those involved and hope that the natural resource inventory may serve as a valuable planning tool in support of smart growth and land conservation in Gilmanton.

GILMANTON STATISTICS

The table below lists total acres and protected acres for the constraints to development.

Definitions:
[Town Acres] = Acreage of portion in Gilmanton.
[% Town] = % of town represented by that value.
[Protected] = Acreage within conservation land.
[% Protected] = % of feature that lies within conservation land.

"High Value" areas in the last row are those areas with resource values >= 4, representing 25% of Gilmanton's area.

Constraints to Development

Constraint	Town Acres	% Town	Protected	% Protected
Developed Lands & ROW	1,035.7	2.7	61.4	5.9
Slopes > 25%	2,564.3	6.7	909.3	35.5
Wetlands	1,588.3	4.2	237.5	15.0
Surface Water Bodies	1,385.1	3.6	32.4	2.3
Total (excl. conservation lands)	6,550.6	17.2	1,235.6	18.9
Conservation Lands	4,796.8	12.6	4,796.8	100.0
Total - All Constraints	10,111.7	26.5	4,796.8	47.4
High Value Co-occurrence	9,537.1	25.0	1,270.5	13.3

All values are GIS calculated and are approximate. Gilmanton's area is calculated to be 38,125 acres.

CONSTRAINTS TO DEVELOPMENT

This map displays features that may constrain or limit development. These constraints may be due to physical limits such as those imposed by surface waters and extreme steep slopes or they may be due to local, state, or federal regulatory restrictions to development such as those associated with wetlands and conservation lands.

Constraints displayed here include the following:

- Conservation Lands
- Wetlands
- Surface Water Bodies
- Developed Lands & Road Rights-of-Way
- Steep Slopes > 25%

"Developed Lands" were derived from the developed classes of the 2001 NH Landcover (100, 140). Road rights-of-way were derived by applying the following buffers to road centerlines: 100' to routes 140 & 106, 50' to routes 107 & 129, and 25' to all other roads excluding class VI roads and trails.

With the possible exception of the conservation lands and surface water bodies, these constraints do not necessarily prohibit development. They are displayed here to help identify some of Gilmanton's limits to development and as a guideline for future development.

RESOURCE RICH AREAS

Gilmanton's high value natural resource areas are displayed here in black cross-hatch overlying the constraints layers. High value natural resource areas are defined as the 25% of Gilmanton with the highest co-occurrence values, which translates to values of 4-11 points. They represent the areas where multiple natural resources exist on the same location. These may be considered priority areas for protection. For the details on the natural resource factors and the values behind the co-occurrence analysis, please refer to the separate co-occurrence map.

The locations of both the resource rich areas and the development Constraints may be used as a tool to help prioritize and guide Gilmanton's future protection and development.

Constraints to Development

Gilmanton Natural Resources Inventory

Map prepared by the Society for the Protection of NH Forests
for the Gilmanton Conservation Commission with assistance from
Blue Moon Environmental, Inc. and the Gilmanton School, February 2005.

Society for the Protection of NH Forests
GIS Services Program
54 Portsmouth Street, Concord, NH 03301 (603) 224-9945

Scale - 1:24,000

0 0.5 1 1.5 2 2.5 3 3.5 Miles

0 2000 4000 8000 12000 16000 Feet

2.2 Ecological Regions

Like the rest of New England, Gilmanton was shaped by glaciation. The motion of the glacier moved large amounts of rock and soil materials and smoothed the topography giving a more rounded appearance to the topography. However, the glacier also left us with coarse, stony and often infertile soils.

By combining knowledge of the physical environment with what is known of the distribution of plants and animals, the U.S. Forest Service has divided New Hampshire into the following three principal biophysical or ecological regions or sections:

- Southern New England Coastal Plain and Hills Section (southeastern part of NH);
- Vermont-New Hampshire Upland Section (southwestern part of NH);
- White Mountain Section (Northern part of NH).

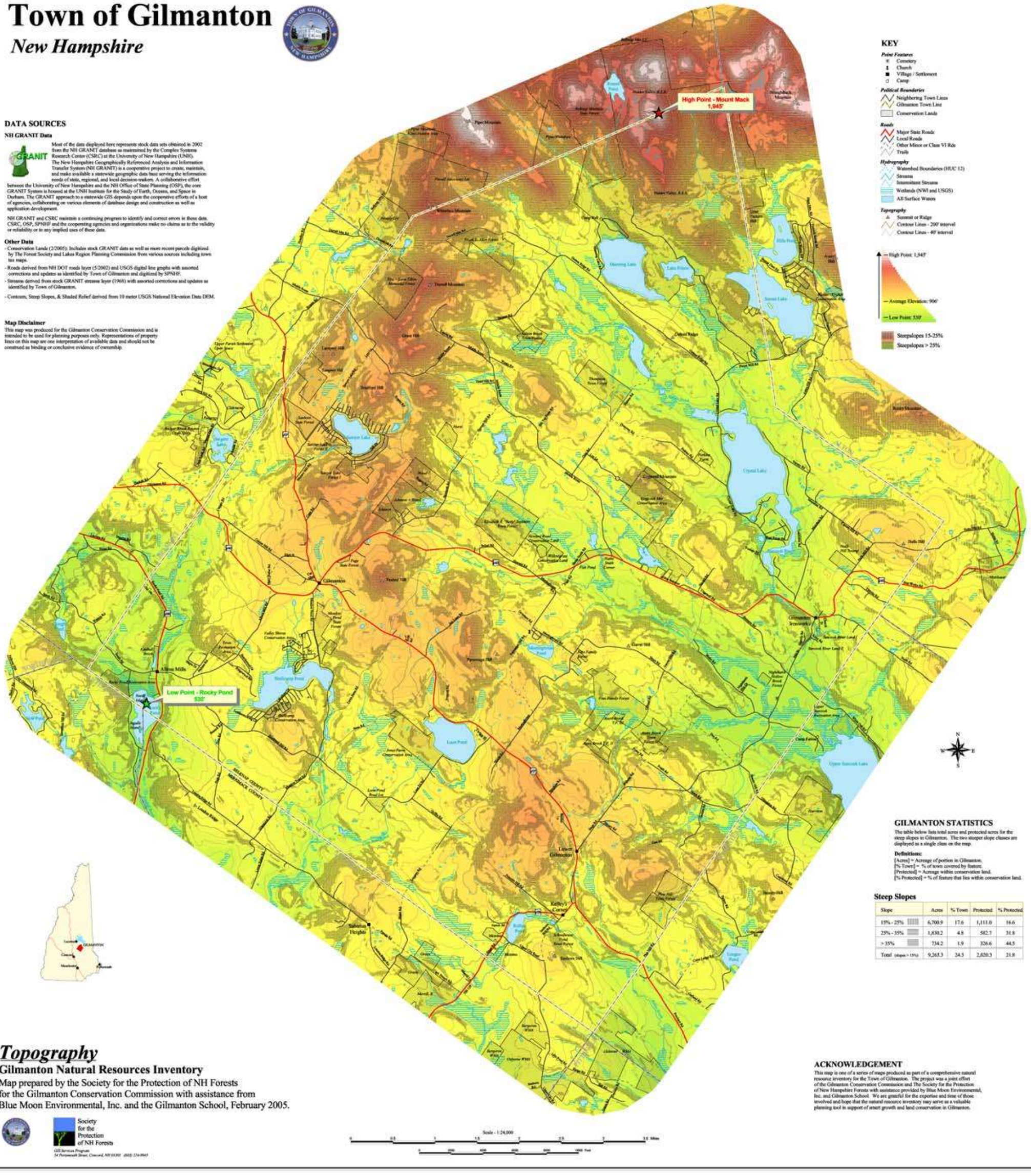
Gilmanton is located in the Southern New England Coastal Plain and Hills Section which can be further divided into three subsections:

- Gulf of Maine Coastal Lowland (immediate coastal region);
- Gulf of Maine Coastal Plain (southern portion);
- Sebago-Ossipee Hills and Plain (northern portion).

Gilmanton is in the Sebago-Ossipee Hills and Plain, a subsection characterized by more rugged topography. Mountains, hills and ridges of glacial outwash, large wetland complexes and large natural lakes distinguish this subsection.

Town of Gilmanton

New Hampshire



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- Gilmanton Town Line
- Conservation Lands

Roads
- Major State Roads
- Local Roads
- Other Minor or Class VI Rds
- Trails

Hydrography
- Watershed Boundaries (HUC 12)
- Streams
- Intermittent Streams
- Wetlands (NWI and USGS)
- All Surface Waters

Topography
- Summit or Ridge
- Contour Lines - 200' interval
- Contour Lines - 40' interval

— High Point: 1,945'

— Average Elevation: 906'

— Low Point: 530'

Steepslopes 15-25%

Steepslopes > 25%

DATA SOURCES

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- Streams derived from stock GRANIT streams layer (1968) with assorted corrections and updates as identified by Town of Gilmanton.
- Contours, Steep Slopes, & Shaded Relief derived from 10 meter USGS National Elevation Data DEM.

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GILMANTON STATISTICS

The table below lists total acres and protected acres for the steep slopes in Gilmanton. The two steeper slope classes are displayed as a single class on the map.

Definitions:
[Acres] = Acreage of portion in Gilmanton.
[% Town] = % of town covered by feature.
[Protected] = Acreage within conservation land.
[% Protected] = % of feature that lies within conservation land.

Steep Slopes

Slope	Acres	% Town	Protected	% Protected
15% - 25%	6,700.9	17.6	1,111.0	16.6
25% - 35%	1,830.2	4.8	582.7	31.8
> 35%	734.2	1.9	326.6	44.5
Total (slopes > 15%)	9,265.3	24.5	2,020.3	21.8

Topography

Gilmanton Natural Resources Inventory

Map prepared by the Society for the Protection of NH Forests
for the Gilmanton Conservation Commission with assistance from
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Society for the Protection of NH Forests
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3.0 Soils

Still Seeking Farm Photo ~ Photo Courtesy of Michelle Descoteaux

"Land is not merely soil, it is a fountain of energy flowing through a circuit of soils, plants and animals." **~Aldo Leopold, author, philosopher, scientist and conservationist**

Understanding the nature and properties of soils is critical to managing and conserving our natural resources. Through its Soil Survey Program, the Natural Resources Conservation Service (NRCS) studies and inventories soil resources across the country. Soil scientists make this study in order to determine what soils are present, where they are located and how they can be used. Soil surveys contain information in the form of detailed soils maps, data tables and text narratives that can be used in order to determine appropriate uses for the land. Soil surveys predict soil behavior for selected land uses. These surveys highlight the soil's inherent limitations and hazards as well as the impact of selected land uses on the environment.

It is important to note that these soil survey maps are designed for general planning purposes and are not at a scale appropriate for site specific use. A site-specific soils map should be done by a licensed professional soil scientist wherever there are concerns about the capability of the land for development. The soil survey maps should not be enlarged because this would imply more accuracy in the data than is present.

Two important classifications of soil are as follows:

- ***Prime Farmland Soils*** are those soils best suited to agriculture. These soils are of the highest quality and can continually produce high yields.

- ***Soils of Statewide Importance*** are soils that are not prime or unique but are of statewide import. The soils in this category are important to agriculture, but exhibit some properties that exclude prime farmland. These soils can be farmed satisfactorily, producing fair to good yields.

3.1 Belknap County Soils Maps

The most recently published edition of the Belknap County Soil Survey was issued in 2015. These soils are available in print or digitized online through GRANIT.

3.2 Soils Recommendations

Soils determine, in part, how land should and should not be used. It is important that land use decisions be based on accurate soils information.

Recommend site-specific soil mapping or high-intensity soil survey (HISS) mapping on all subdivision applications. Soil mapping must be completed by a certified soil scientist in accordance with the standards, either HISS standards or site-specific mapping. Site-specific mapping requires that a report be submitted by the certified soil scientist. The certified soil scientist should be required to approve all plans that show the delineated soils.

Town of Gilmanton, New Hampshire

Natural Resources Inventory

Agricultural Soils

The Base Map is a primary map for a Natural Resources Inventory. It shows the community without any additional resources. Most of the features on this map appear on other maps in this NRI.

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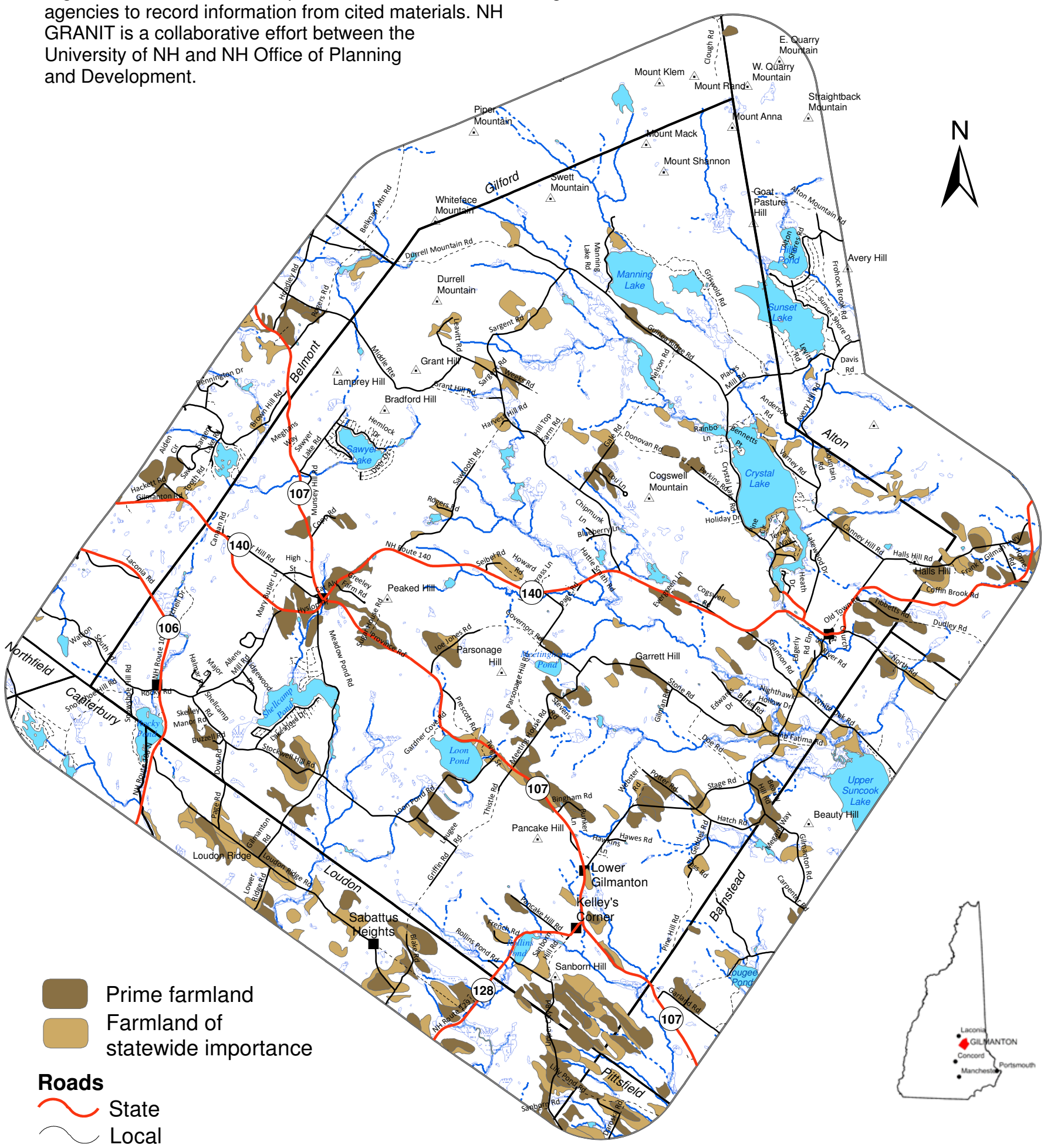


Prime farmland

Farmland of statewide importance

Roads

State

Local

Discontinued or private

Villages

Peaks/Hills/Ridges

Town Boundaries

Lakes and Ponds

NWI Wetlands

Intermittent Stream

River/Stream

1.5 0.75 0 1.5 Miles

10,000 5,000 0 10,000 Feet

Map prepared by Nanci Mitchell for the Gilmanton Conservation Commission, March 2023.

4.0 Agricultural Resources

Harvest Moon over Frisky Hill ~ Photo Courtesy of Thomie Dombrowski

"Let us not forget that the cultivation of the earth is the most important labor of man. When tillage begins, other arts will follow. The farmers, therefore, are the founders of civilization". **~Daniel Webster**

Farming in New Hampshire involves various agricultural land uses ranging from intensively cropped land to open pastures and hay meadows and farm woodlots. These lands are important not only to the cultural heritage and open space values of the state, but also to the contribution agriculture makes to the state's economic activity (SPNHF - "NH Changing Landscape").

In 1840, Gilmanton was one of the best farming towns in the State, with 523 men engaged in agriculture. Gilmanton produced more wheat, dairy, cattle and hay than any other town in New Hampshire. (Lancaster's *History of Gilmanton).* Gilmanton's early history and stone walls attest to the town's rural roots.

We value agricultural land in Gilmanton not only for the food that its farmers produce, but also for its non-food products such as timber, floriculture and hay, scenic beauty and diverse habitat.

According to Gilmanton's 2018 Master Plan, *"agriculture is a vital part of the local economy and preserving our farming community should be supported".* Results of the 2018 Master Plan question, "Why do you feel Gilmanton is a desirable place to live?" 88.75% responded because of the small town/rural atmosphere and 82.5% responded because of the scenic beauty and natural resources. Discussions with survey participants indicate a growing concern for the future of Gilmanton's rural heritage. Increasing expenses, lower profits and pressure from escalating development are major concerns.

Agriculture in NH is defined in RSA 21:34-a Farm, Agriculture, Farming. The first part of this law states, "The word "farm" means any land, buildings, or structures on or in which agriculture and farming activities are carried out or conducted and shall include the residence or residences of owners, occupants, or employees located on such land. Structures

shall include all farm outbuildings used in the care of livestock, and in the production and storage of fruit, vegetables, or nursery stock; in the production of maple syrup; greenhouses for the production of annual or perennial plants; and any other structures used in operations named in paragraph II of this section."

Paragraph II goes into detail about what operations are considered to be agriculture. A few that are included are the raising of livestock, raising of bees, greenhouse crops, production, cultivation, growing, harvesting, and sale of any agricultural, floricultural, viticultural, forestry, or horticultural crops, production of compost and forestry. This paragraph also includes marketing or selling at wholesale or retail, which includes agritourism. For more detail, please refer to the RSA.

Gilmanton's farmers and farm families help other residents connect with the town's rural heritage and promote better land management. Much of the character of the town we owe to those who have sustained their farms and agricultural lands for several generations. These farms and agricultural operations are an active and important part of Gilmanton. Some of these farmers maintain fields held by others in addition to their own.

Gilmanton's farms have increased from the 30 farms recorded in the 2004 Natural Resources Inventory, to over 50 farms in 2022. This increase in farms has encouraged the formation of Gilmanton's Own Market, Inc. in 2017, Gilmanton's Farmer's Market in 2020, and numerous roadside farm stands. The trend to buy local is growing exponentially.

4.1 Important Agricultural Soils

Productive farming is dependent upon a key natural resource: **productive soils.** Important agricultural soils are a good indicator for current and potential farmland. Because farm soils are typically found on land that is flat, open, and therefore easily developed, a significant share of an already scarce resource has been converted permanently to other land uses. Farmlands provide much more than a place to produce crops and livestock.

Prime Farmland is one of the most important resources of the Nation. This exceptional land can be farmed continuously, or nearly continuously, without degrading the environment. It will produce the most food, feed, etc. with the least amount of energy used. This land has the highest percentage of soils that can be minimally tilled. The soils have a pH between 4.5 and 8.4 in all horizons. This range of pH is favorable for growing a wide variety of crops without adding large amounts of amendments.

Prime Farmland Soils are those soils best suited to food, feed, forage, fiber, and oil seed crops. The soils are of the highest quality and can economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. Prime agricultural soil is common near the Four Corners and in Lower Gilmanton on Sanborn Hill and near the intersection of Stage Road and Route 107. Stockwell and Frisky Hills are also underlain by both prime agricultural soils and soils of statewide importance.

Unique Farmland is farmland other than prime that is used for the production of specific high value food and fiber crops in New Hampshire. In order to qualify as unique farmland, a high value food or fiber crop must be grown. Examples of unique farmland in NH are apple orchards, lowbush blueberry lands, vegetable crops and maple sugar bushes.

Soils of Statewide Importance are soils that are not prime or unique but are of statewide importance for the production of food, feed, fiber, forage and oilseed crops. The soils in this category are important to agriculture in NH, yet they exhibit some properties that exclude prime farmland. These soils can be farmed satisfactorily by greater inputs of organic fertilizer, soil amendments and erosion control practices. They produce fair to good crop yields when managed properly. Some of this land is currently in forest, but tree age is generally 20 years or less.

Protecting Farmlands increases diversity in the landscape, such as scenic diversity and wildlife habitats. Keeping land in farming also builds a more sustainable and local food source. As open space, farmlands preserve local hydrology, ameliorating flooding and increasing infiltration and groundwater storage, which is important in the context of more frequent and intense precipitation events as our climate changes. It is also important that best management practices are followed to preserve water quality.

Table 1. Farm Products Produced in Gilmanton		
Angora wool and mohair	Herbs and spices (basil, dill, lavender, lemon balm, lemon verbena, mint, parsley, peppers, sage, salts, sugars, thyme, winter savory)	Pumpkins
Apples		Rabbit
Bees and bee supplies		Raspberries and Blackberries
Blueberries		Rhubarb
Butter		Soaps
Canned and preserved goods		Sodas
Cheese	Honey and honey products	Strawberries
Condiments	Hydroponic greens	Tea
Cream	Maple syrup	Vegetables (asparagus, beets, chard, green and yellow beans, lettuce, kale, peas, peppers, radishes, squash, sweet corn, tomatoes)
Eggs (chicken, duck, quail)	Milk (cow, goat)	
Farriers and horses	Mustards	
Floriculture	Peaches	Wine
Garlic and garlic scapes	Pork, beef, lamb	Wood
Hay and silage	Poultry (chicken, duck, turkey, squab and geese)	

4.2 Why Buy Local?

Environment: Our small-scale farms preserve green space and protect diverse wildlife populations. Buying locally cuts carbon emissions produced by trucking food and/or flowers thousands of miles.

Taste: Local produce is fresher and therefore tastes better.

Health: Food grown close to where it is consumed has more nutritional value because it has deteriorated less during transport. Local Organic, when it is available, is considered the best option.

Money: Using local produce, meats, and flowers keeps our farmers in business and puts money back into our local economy. Buying from our Gilmanton farms cuts out the middleman which means farm families can afford to stay on the farm doing the work they love.

Taxes: The green space preserved by supporting our local farms keeps property taxes in check.

Community: Gilmanton's Own Market, Inc., Gilmanton Farmer's Market and our local farm stands are great places to meet our neighbors.

4.3 Why Protect Farmland?

Agriculture is important to Gilmanton in many ways. Gilmanton farms contribute to the Town economically and the Town's residents are fortunate to enjoy locally grown produce, fruit, dairy products, meat, poultry, eggs, maple syrup, hay, honey, timber, and Christmas trees. The open fields and farm structures are a part of the rural character that is so important to the Town.

Protect the Important Farmland soils that are necessary for economically viable agricultural activities. Once developed, these soils are lost forever.

- Farmland is a rapidly disappearing natural resource;
- Local farms provide fresh food at a reasonable cost;
- Protecting local farmland keeps property taxes down;
- Preserved farmland protects local scenery and promotes local tourism;
- Local farm businesses support farm and farm-related jobs;
- Locally protected farms benefit the environment;
- Well-managed farms protect soil and prevent water contamination;
- Healthy soils sequester carbon;
- Open space in farms and forests facilitates groundwater recharge;
- Farms provide critical habitat for wildlife.

4.4 Farms and Carbon Footprint

Utilizing chemical fertilizers and pesticides, which require copious amounts of fossil fuel during the manufacturing process, increases human carbon footprint. Composting and organic gardening, on the other hand, can reduce human's impact on the planet. Fertilizers also produce greenhouse gases after farmers apply them to their fields. Crops only take up, on average, about half of the nitrogen they get from fertilizers.[1] Much of the applied fertilizer runs off into waterways, or gets broken down by microbes in the soil, releasing the potent greenhouse gas nitrous oxide into the atmosphere. Although nitrous oxide accounts for only a small fraction of worldwide greenhouse gas emissions,[2] pound for pound, nitrous oxide warms the planet 300 times as much as carbon dioxide.[3]

https://climate.mit.edu/explainers/fertilizer-and-climate-change

[1]The Royal Society. "Ammonia: Zero-Carbon Fertiliser, Fuel and Energy Store." Feb. 2020.

[2]US EPA. "Global Greenhouse Gas Emissions Data." Greenhouse Gas Emissions, 12 Jan. 2016.

[3]Canfield, Donald E., et al. "The Evolution and Future of Earth's Nitrogen Cycle." Science, vol. 330, no. 6001, Oct. 2010, pp. 192–96, doi:10.1126/science.1186120.

4.5 Agricultural Recommendations

Agriculture is important to Gilmanton in many ways. Gilmanton farms contribute to the Town economically and the Town's residents are fortunate to enjoy locally grown produce, fruit, dairy products, meat, poultry, eggs, maple syrup, hay, honey, timber, and Christmas trees. The open fields and farm structures are a part of the rural character that is so important to the Town. This is an important resource to be protected.

Some recommendations to help sustain economically viable agriculture in Gilmanton are:

- Complete an Agricultural Profile for the Town;
- Protect the Important Farmland soils that are necessary for economically viable agricultural activities. Once developed, these soils are lost forever;
- Educate farmers about the benefits of conservation easements on their property, https://www.nrcs.usda.gov/NewHampshire/ACEP-ALE;
- Reduce conflict between agricultural and residential uses by requiring a buffer when land is developed adjacent to a farm;
- Support legislation economically beneficial to small agriculture, provided the legislation does not have a negative ecological impact;
- Encourage residents to buy local;
- Educate farmers about the importance of exercising care with Chemical Fertilizers & Insecticides - Choose Organic over Synthetic; and
- Encourage farmers to follow "Best Management Practices" in the management of their farm.
- Conserve lands underlain by prime agricultural soil or soils of statewide importance.

Resources for Farmers

- Manual of Best Management Practices for Agriculture in New Hampshire, published by the New Hampshire Department of Agriculture, Markets, and Food in 2017
- Planting for Pollinators, published by the UNH Cooperative Extension
- 2017 Census of Agriculture, Belknap County Profile, published by the United States Department of Agriculture
- https://climate.mit.edu/explainers/fertilizer-and-climate-change
- https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/
- https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/New_Hampshire/cp33001.pdf

5.0 Water Resources

Meeting House Pond ~ Photo Courtesy of Anne Onion

"A field of water betrays the spirit that is in the air. It is continually receiving new life and motion from above. It is intermediate in its nature between land and sky."

~ Henry David Thoreau

Gilmanton's water resources consist of a hydrologically connected system of ponds and lakes, streams and rivers, wetlands, and groundwater. Gilmanton's surface and groundwaters are intricately interconnected. In some locations and under some conditions, the surface waters recharge the groundwater and in other locations and conditions, the groundwaters feed our lakes, wetlands and streams and keep surface waters flowing even during droughts. The quality and quantity of one can significantly affect the other.

Our water resources are vital for habitat for plants and animals. Undeveloped shoreline areas are essential for almost all wildlife species during some portion of their life cycle. Gilmanton residents rely upon clean groundwater from private wells. These lakes and ponds, and the quality of their waters and shoreline, are very important to the quality of life for residents and visitors. Fishing, boating, and swimming in Gilmanton's waters are popular activities. Our lakes and ponds add enormous value to the tax base and host many second homes, which provide significant income to the town.

5.1 Watersheds

A watershed is defined by the height of land around a basin that feeds water into a particular river system. How people use land within a watershed determines the quality of the water in the lakes, streams, wetlands, and groundwater below. Gilmanton lies entirely within the large watershed of the Merrimack River. There are five smaller watersheds within the town that all flow into tributaries of the Merrimack. The headwaters for each of these watersheds are primarily in Gilmanton, which means that the quality of these water sources depends

primarily on how Gilmanton landowners care for their land and the land use decisions that are made by the Town. Each watershed is shown as a different color on the Surface Water Features Map.

1. Winnipesaukee River Watershed – (6.87% of town) This watershed is in the northwestern section of town. It is drained by the streams that flow into Sawyer Lake and its outflow, Badger Brook, on its way to Belmont. The watershed is defined by the height of land formed by Lamprey and Bradford Hills in the north, the hills east of Sawyer Lake, and the transfer station on Rt. 107. It is sparsely populated with the exception of the Sawyer Lake area.
2. Soucook River Watershed – (24.32% of town) This watershed includes Gilmanton Corners and the southwestern part of town. Its watercourses include: Huckins Brook, flowing from the Corners into Shellcamp Pond; Academy Brook, draining Shellcamp Pond; Loon Pond and its tributaries; Loon Pond Brook; and Kimball Brook which parallels Route 106 and flows into Rocky Pond. Development is concentrated in the Corners village, near Allens Mill Road, around Shellcamp Pond, and in the business zone on Rt. 106.
3. Upper Suncook River Watershed – (60.91% of town) The Suncook River's most northerly headwaters are in the Belknap Mountains. Upper Round Pond in Gilford and Hills Pond and Sunset Lake (partially) in Alton flow into Crystal Lake, where the Suncook River begins. Important tributaries to the Suncook include Nelson Brook and its associated wetland complexes: Nighthawk Hollow Brook; Varney Brook and Meetinghouse Pond; and Ayers Brook. This watershed empties into Upper Suncook Lake just after the Suncook River leaves Gilmanton and enters Barnstead near Camp Fatima. Development that impacts this watershed is focused around Crystal Lake, the Iron Works village and Stone Road area.
4. Lower Suncook River Watershed – (7.66% of town) A small portion of this watershed is located in the southern tip of Gilmanton. It drains into Rollins Pond and Kelley Brook. From there it flows into Barnstead and the Suncook.
5. Winnipesaukee Drainage Watershed – (0.18% of town) A very small portion of this watershed is in Gilmanton. It is to the northeast of the top of Hall's Hill.

5.2 Lakes and Ponds

Gilmanton is blessed with all or portions of eleven lakes and ponds of at least ten acres in size. Termed "great ponds" by the NH State Legislature, these are public water bodies held in public trust for all the people of New Hampshire. These lakes and ponds are shown on the Surface Water Features Map and Table 3.

Table 2. Gilmanton's Great Ponds

Name	Pond Size (acres)	Acres in Gilmanton	Percent in Gilmanton	Lake Association
Crystal Lake, including Suncook River above dam	451	451	100%	yes
Sunset Lake	253	50	20%	yes
Manning Lake	196	196	100%	no
Shellcamp Lake	148	148	100%	yes

Loon Pond	128	128	100%	yes
Rocky Pond	82	38	36%	no
Sawyer Lake	82	82	100%	no
Lake Eileen	45	45	100%	no
Gillan Pond	33	33	100%	no
Rollins Pond	30	30	100%	no
Meetinghouse Pond	26	26	100%	no
TOTAL	1,474	1,227		

Landowners around some of Gilmanton's lakes and ponds have formed associations that, among other things, focus on the quality and use of the lakes. Some of them monitor the quality of the water and report results to the Department of Environmental Services (DES) Volunteer Lakes Assessment Program.[1]

The total area of great ponds that are located within the boundaries of Gilmanton is 1,227 acres. Note that portions of Rocky Pond and Sunset Lake are outside of the Town. Some of these ponds' shorelines were intensively developed before zoning was adopted by the town in 1970. Sawyer Lake, Crystal Lake, and parts of Shellcamp and Loon do not have much undeveloped shoreline left. The quality of the water in these lakes depends upon careful land management by landowners to minimize the application of lawn chemicals, maintain and pump out septic systems regularly, retain shoreline tree and shrub buffers, and minimize exposure of raw soil to the elements. Many of these lakes and ponds are affected by dams. Careful management of these dams can minimize shoreline erosion and impact upon aquatic species.

Some ponds are relatively undeveloped, including Meetinghouse, Rollins, and Eileen. In addition, portions of the shoreline on Manning, Loon, Shellcamp and Sunset are undeveloped and of great value to wildlife, water quality, and scenic beauty. Significant portions of the shoreline of Manning Lake and Sunset Lake are owned by the Daniel Webster Boy Scout Council and protected from development under a conservation easement held by the State of New Hampshire. The southwest shoreline of Loon Pond is protected from further development by a conservation easement currently held by the Forest Society. Meetinghouse Pond is partially protected by a conservation easement held by the Five Rivers Conservation Trust.

Ponds of less than ten acres in size can also be a very important habitat. Two kettle hole ponds on Crystal Lake Road, one opposite Boat Ramp Road and one at the intersection with Pine Circle, are very unusual and largely intact. A smaller kettle hole pond is on Pine Circle closer to Crystal Lake. A kettle hole is a hollow that results from the melting of a mass of ice trapped in glacial deposits. The hole fills with water, vegetation accumulates and peat develops. They are ringed by vegetation typical of bogs.

Land uses adjacent to ponds, lakes and rivers have a significant impact upon the quality of the water. The State of NH passed the Comprehensive Shoreland Protection Act (CSPA) on July 1, 1994 to regulate activities within 250 feet of the edge of all great ponds and fourth

[1]For more information, contact the NHDES Volunteer Lake Assessment Program at (603) 271-2658.

order or higher rivers. The Act was amended in 2008 and renamed the Shoreland Water Quality Protection Act, RSA 483-B. The Act was further amended in 2011, 2017, and 2021. Great ponds in Gilmanton are listed in Table 3. There are no fourth order or higher rivers in Gilmanton. A natural woodland buffer, where existing, must be maintained within 150 feet of the water and a primary structure must be set back 50 feet from the water. Additional information about this law can be found on the web at http://www.des.nh.gov/land/waterfront-development.

Other sources of information include *Planting Shoreland Areas* by Ralph M. Winslow Jr., UNH Coop. Ext. available online at http://ceinfo.unh.edu/Pubs/HGPubs/plntshor.pdf and *A Guide to Developing and Re-Developing Shoreland Property in New Hampshire,* available from the North Country Resource Conservation and Development Area Council in Laconia.

Two invasive aquatic plant species, milfoil and fanwort, are another threat to Gilmanton's lakes and ponds. These plants displace beneficial native plants and become economical and recreational nuisances by forming dense matted stands in shoreline areas. According to the NH Lakes Association (https://NHlakes.org), there are approximately 90 lakes and rivers in NH with known areas of invasive species and 75 are infested with milfoil. Rocky Pond and Shellcamp Pond are currently infested with milfoil. However, the plant is readily introduced into another lake when a fragment attaches itself to a transient boat or boat trailer. Boat owners should clean, drain, and dry their boat and trailer carefully before launching.

5.3 Rivers and Streams

The Suncook River and the many named and unnamed streams in Gilmanton are an important natural resource. There are 94 miles of perennial rivers and streams in the Town and 35 miles of mapped intermittent streams. Many intermittent streams are too small to be mapped and are not included in the above statistics. Few of these water resources have any sort of biological or chemical monitoring. However, all of these streams are at the headwaters of a watershed and their water quality has a significant impact upon the water quality of the entire watershed. The rivers and streams played an important role in the settlement and early industry of the town. Historic mill sites are located on the Suncook in the Iron Works village, as well as on Academy Brook (Jones Mill), Kimball Brook (Allens Mill), and Kelley Brook. Numerous aquatic species call these rivers and streams home. The water courses and their adjacent riparian corridors are important habitat and travel corridors for most of Gilmanton's terrestrial wildlife. In addition, many bird species are attracted by the water and the food sources that are located nearby.

Table 3. Gilmanton's Named Rivers and Streams

Watershed	River/Brook
Winnipesaukee River Watershed	Badger Brook
Soucook River Watershed	Kimball Brook Academy Brook Loon Pond Brook Huckins Brook

Upper Suncook River Watershed	Suncook River Nelson Brook Nighthawk Hollow Brook Varney Brook Ayers Brook
Lower Suncook River Watershed	Kelley Brook

The quality of water and habitat in rivers and streams depends upon surrounding land uses and management practices. Sediment from erosion destroys spawning habitat and fills stream beds. Removal of streamside vegetation raises water temperatures and can destroy habitat for trout and many other species upon which fish depend.

Presently, stream habitat is relatively unaltered except for a few intensely developed locations, such as in the Corners village along Huckins Brook, and along Rt. 106 and Kimball Brook. There are no significant human withdrawals of water from Gilmanton's streams or rivers. However, as development pressures mount, streambanks and stream integrity will be threatened.

5.4 Water Resource Recommendations

- Ensure 50-foot buffers are maintained along streams and riparian areas.
- Educate the public about non-point pollution from pesticides, fertilizers, sediment, and other pollutants in water runoff.
- Inform the public of the Shoreland Water Quality Protection Act (RSA 483-B).
- Conserve the few remaining undeveloped areas of lake and pond frontage.
- Maintain public access to Gilmanton's lakes and ponds and the Suncook River.
- Prevent the spread of invasive aquatic plants to uninfected lakes and ponds through education and monitoring at boat launches.
- Engage in further research and education on the effects of climate change on water resources.

Town of Gilmanton

New Hampshire

DATA SOURCES

NH GRANIT Data

Most of the data displayed here represents stock data sets obtained in 2002 from the NH GRANIT database as maintained by the Complex Systems Research Center (CSRC) at the University of New Hampshire (UNH).

The New Hampshire Geographically Referenced Analysis and Information Transfer System (NH GRANIT) is a cooperative project to create, maintain, and make available a statewide geographic data base serving the information needs of state, regional, and local decision-makers. A collaborative effort between the University of New Hampshire and the NH Office of State Planning (OSP), the core GRANIT System is housed at the UNH Institute for the Study of Earth, Oceans, and Space in Durham. The GRANIT approach to a statewide GIS depends upon the cooperative efforts of a host of agencies, collaborating on various elements of database design and construction as well as application development.

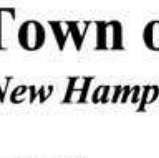
NH GRANIT and CSRC maintain a continuing program to identify and correct errors in these data. CSRC, OSP, SPNHF and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

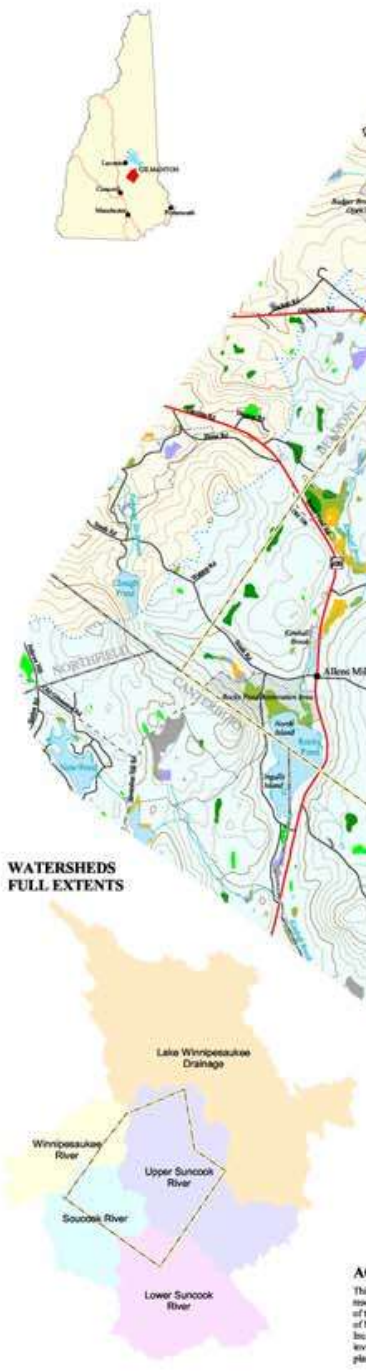
Other Data

- Conservation Lands (2/2005): Includes stock GRANIT data as well as more recent parcels digitized by The Forest Society and Lakes Region Planning Commission from various sources including town tax maps.
- Roads derived from NH DOT roads layer (5/2002) and USGS digital line graphs with assorted corrections and updates as identified by Town of Gilmanton and digitized by SPNHF.
- Streams derived from stock GRANIT streams layer (1968) with assorted corrections and updates as identified by Town of Gilmanton.
- Contours derived from USGS National Elevation Data DEM (10 meter cell size).

Map Disclaimer

This map was produced for the Gilmanton Conservation Commission and is intended to be used for planning purposes only. Representations of property lines on this map are one interpretation of available data and should not be construed as binding or conclusive evidence of ownership.





WATERSHEDS FULL EXTENTS

ACKNOWLEDGEMENT

This map is one of a series of maps produced as part of a comprehensive natural resource inventory for the Town of Gilmanton. The project was a joint effort of the Gilmanton Conservation Commission and The Society for the Protection of New Hampshire Forests with assistance provided by Blue Moon Environmental, Inc. and Gilmanton School. We are grateful for the expertise and time of those involved and hope that the natural resource inventory may serve as a valuable planning tool in support of smart growth and land conservation in Gilmanton.

Surface Water Features

Gilmanton Natural Resources Inventory

Map prepared by the Society for the Protection of NH Forests
for the Gilmanton Conservation Commission with assistance from
Blue Moon Environmental, Inc. and the Gilmanton School, February 2005.

Society for the Protection of NH Forests

GIS Services Program
54 Portsmouth Street, Concord, NH 03301 (603) 224-9945

Scale - 1:24,000

0 0.5 1 1.5 2 2.5 3 3.5 Miles

0 2000 4000 6000 8000 10000 Feet

KEY

Point Features
- Cemetery
- Church
- Village / Settlement
- Camp

Political Boundaries
- Neighboring Town Lines
- Gilmanton Town Line
- Conservation Lands

Roads
- Major State Roads
- Local Roads
- Other Minor or Class VI Rds
- Trails

Topography
- Summit or Ridge
- Contours - 200' interval
- Contours - 40' interval

Hydrography
- Streams
- Intermittent Streams
- All Surface Waters

Wetlands
- Emergent
- Forested-Deciduous
- Forested-Evergreen
- Forested-Dead
- Deciduous-Shrub
- Evergreen-Shrub
- Unconsolidated Bottom

Watersheds
- Lake Winnipesaukee Drainage
- Winnipesaukee River
- Soucook River
- Upper Suncook River
- Lower Suncook River
- Watershed Boundaries (HUC 10)

GILMANTON STATISTICS

The tables below list total acres and protected acres for the key resources displayed on this map.

Definitions:
[Total Acres] = Acreage of entire watershed.
[Town Acres] = Acreage of portion in Gilmanton.
[% Town] = % of town covered by feature.
[% Wshed] = % of watershed in town.
[Protected] = Acreage within conservation land.
[% Protected] = % of feature that lies within conservation land.

NWI Wetlands

NWI Wetland Class	Town Acres	% Town	Protected	% Protected
Emergent	523.9	1.4	78.2	14.9
Forested-Deciduous	286.9	0.8	28.1	9.8
Forested-Evergreen	186.3	0.5	11.6	6.2
Forested-Dead	88.8	0.2	17.6	19.8
Deciduous-Shrub	287.5	0.8	57.0	19.8
Evergreen-Shrub	2.5	0.0	0.0	0.0
Unconsolidated Bottom	307.5	0.8	64.1	20.8
Total (all NWI)	1,683.4	4.4	256.6	15.2

Streams

Stream Class	Length	Protected	% Protected
Intermittent Streams	22.3 miles / 117,852'	1.8 miles / 9,341'	7.9
Perennial Streams	61.7 miles / 325,984'	9.5 miles / 49,967'	15.3
Total	84.0 miles / 443,836'	11.3 miles / 59,308'	13.4

Watersheds

Watershed	Total Acres	Town Acres	% Town	% Wshed	Protected	% Protected
Lake Winnipesaukee Drainage	88,897	69	0.2	0.1	0	0.0
Soucook River	21,696	9,279	24.3	42.8	334	3.6
Lower Suncook River	34,222	2,924	7.7	8.5	156	5.3
Upper Suncook River	45,397	23,236	60.9	51.2	3,916	16.9
Winnipesaukee River	16,583	2,620	6.9	14.1	391	14.9
Total	208,796	38,128	100.0	18.3	4,797	12.6

Note: All values in these tables are GIS calculated and are approximate. Gilmanton area is calculated to be 38,128 acres.

Surface Waters: Lakes, Ponds, Rivers

Town Acres	% Town	Protected	% Protected
1,385.1	3.6	32.4	2.3

6.0 Groundwater and Drinking Water

Crystal Lake site of two vital aquifers ~ Photo Courtesy of Thomie Dombrowski

"Water is the driving force of all nature." ~ Leonardo da Vinci

Gilmanton's residents rely on groundwater for their drinking water. Most wells are drilled into bedrock or dug into glacial till.

6.1 Aquifers and Aquifer Recharge

An aquifer can be defined as a formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield significant quantities of water to wells and springs. There are bedrock aquifers and sand and gravel aquifers with the latter being the most productive. A small portion of the town consists of sand and gravel aquifers. These are glacial deposits of sand and gravel that hold significant amounts of water in the pore spaces between the particles of sand and gravel. This groundwater is continuously replenished by rain and other surface waters.

Groundwater, especially in sand and gravel aquifers, is vulnerable to contamination, most often from leaking underground storage tanks, poorly maintained septic systems, improper disposal of hazardous chemicals, or vehicle accidents. Gravel pits are located in or over aquifers. Land over aquifers tends to be favored for development because it is relatively level and easily excavated. The identification and careful monitoring of land uses near aquifers is important. Gilmanton's four sand and gravel aquifers are listed in Table 4.

Table 4. Gilmanton's Sand and Gravel Aquifers

Name	Aquifer Size (acres)	Acres in Gilmanton	Percent in Gilmanton
Crystal Lake Aquifers	626	486	78%
Kimball Brook and Rocky Pond Aquifers	Data N/A	47	Data N/A

Suncook Flats Aquifer	987	733	74%
Sargent Lake Aquifer	60	22	37%

Sand and gravel aquifers in Gilmanton are shown on the Drinking Water Resources Map. The ability of an aquifer to supply water is called transmissivity and is measured in ft^2/day. Most of the aquifers in Gilmanton have a transmissivity of 1000 ft^2/day or less and are not considered adequate for a public water supply. There are 23 acres near Burke Road and approximately 120 acres near Crystal Lake with a transmissivity of 2000–4000 ft^2/day. The most productive aquifer is by Crystal Lake in the area of Pine Circle, Glen Echo Road and Boat Ramp Road. A small 4 acre area by Pine Circle has a transmissivity greater than 8000 ft^2/day and the remaining 137 acres has a transmissivity of 4000–8000 ft^2/day. Unfortunately, there is already considerable development around the best future water supply locations.

Aquifer recharge is the process by which rainwater and snowmelt seeps down through the soil into an underlying aquifer. Many natural processes determine how much of the water actually reaches the aquifer and how much evaporates, is consumed by plants and animals or runs off the ground surface into surface water bodies. Much attention has been directed to the importance of protecting surface waters and wetlands from filling and contamination, but there has been much less effort directed towards protecting critical aquifer recharge areas. These are areas where contamination would directly impact potable water supplies in the aquifer. In addition to eliminating contamination sources, water must be allowed to seep into the ground in order to protect both the quality and the quantity of water in an aquifer. Requiring new development to retain all stormwater and melt water on site will help to maintain pre-development levels of recharge.

A useful publication in this regard is *NH Stormwater Manual,* NH DES, 2008. A useful landowner guide is *New Hampshire's Landowner 's Guide to Stormwater Management,* NH DES 2019, https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/homeowner-guide-stormwater.pdf

6.2 Public Water Supplies

According to NH DES as of November, 2003, Gilmanton has the following public drinking water supplies: Hidden Valley Boy Scout Camp, the Gilmanton School, the Old Town Hall, Centre Congregational Church, United Church of Christ, Chamberlain Hill Day Care and the Crystal Springs Condos. The Drinking Water Resources Map shows a Drinking Water Protection Area around two of these wells, one for the Gilmanton School and one for the Crystal Springs Condos. The Protection Area for Crystal Springs Condos encompasses 122 acres and that for the Gilmanton School is 162 acres. Ideally, this area should be protected from any potential contamination in order to ensure the quality of the well water. Part of the Gilmanton School Protection Area is in the Cogswell Mountain Conservation Area.

A Drinking Water Source Assessment Report for Gilmanton has been prepared by NH DES. This report assesses the vulnerability of each public water system to contamination. For example, the Gilmanton School received highly vulnerable ratings in the following categories: within 1000' of a state highway, pesticide application within 500' of the well, proximity to a

septic system, amount of agricultural land within the wellhead protection area and inappropriate land uses near the well.

6.3 Contamination Sources

The known sites are locations where contamination of the soil or groundwater has occurred and has been cleaned up or is being monitored by NH DES. Some of these sites include the former town dump in the Iron Works, the former landfill on Rt. 107 and a leaking underground storage tank at the Gilmanton School.

Potential contamination sources include underground storage tanks, facilities that generate hazardous waste, large junkyards and point/non-point potential pollution sources. Point/nonpoint potential pollution sources include the Town salt shed and the State DOT facility on White Oak Road, the latter of which is located over an aquifer.

In addition, most recently, the US Environmental Protection Agency has identified PFAs (Per and polyfluoroalkyl substances) in groundwater resources in many areas of the country. USEPA defines PFAs as:

- PFAS are widely used, long lasting chemicals, components of which break down very slowly over time.
- Because of their widespread use and their persistence in the environment, many PFAS are found in the blood of people and animals all over the world and are present at low levels in a variety of food products and in the environment.
- PFAS are found in water, air, fish, and soil at locations across the nation and the globe.
- Scientific studies have shown that exposure to some PFAS in the environment may be linked to harmful health effects in humans and animals.
- There are thousands of PFAS chemicals, and they are found in many different consumer, commercial, and industrial products. This makes it challenging to study and assess the potential human health and environmental risks. (https://www.epa.gov/pfas).

6.4 Impervious Surfaces

When a watershed is increasingly covered with pavement, buildings, and other compacted surfaces that are impervious to water, significant changes in water quality and quantity result. When rain falls on impervious surfaces, it runs off faster into surface waters, carrying with it sediment and pollutants from road surfaces, lawns, construction sites, and parking lots. Flooding, warming, and channelization of streams results. Infiltration of rainfall into the ground to replenish groundwater is reduced.

This type of run-off, called “non-point source pollution” is the most serious threat to water quality for New Hampshire and for Gilmanton. Construction and site designs that promote retention and infiltration of rainwater and runoff, narrower streets and driveways, when possible, shrub and tree buffers to waterways, and more compact development patterns can protect Gilmanton’s water quality and quantity as the town grows.

Studies conducted in the northeast have documented that by converting as little as 10% of a watershed to impervious surfaces, stream water quality and organisms begin to deteriorate.

Above 25% impervious surface, water quality is seriously degraded. The Lakes Region Planning Commission studied the degree of impervious surface cover in the Gilmanton Corners area, using 1993 land cover data. The analysis showed that the average impervious surface cover was 11% for the village area. It is likely that the result would be similar for the Iron Works Village and would be much lower for the remainder of the town, with the exception of the commercial area along Rt. 106.

6.5 Groundwater and Drinking Water Recommendations

- Require that stormwater and melt water be retained on site when land is developed.
- Modify the Gilmanton Zoning Ordinance to prohibit or restrict new potential contamination sources from locating in a wellhead protection area.
- Establish a household hazardous waste collection program that is easier for residents to access, as well as expand outreach for existing hazardous waste collection programs in adjoining towns.
- Gilmanton should continue to keep the town-owned land on Pine Circle due to the productivity of the underlying aquifer.
- The Town should consider conserving land over and adjacent to productive aquifers in order to protect future municipal water supplies.
- Determine the yield of an aquifer to be protected and match it to the maximum development level it will support. Is that development level supported on the land proximate to the aquifer or will the water from the aquifer likely have to be piped several miles to the future development?
- Educate the public as to what they can do to protect groundwater. This should include the importance of reducing nonpoint source pollution from fertilizers, pesticides, and hazardous wastes. The public should also understand the importance of aquifer recharge.
- How to Protect Water Quality - Best Management Practices
- Coordinate with the New Hampshire Department of Environmental Services to research and test potential sources of PFAs in Gilmanton groundwater resources.

Town of Gilmanton

New Hampshire

DATA SOURCES

NH GRANIT Data

Most of the data displayed here represents stock data sets obtained in 2002 from the NH GRANIT database as maintained by the Complex Systems Research Center (CSRC) at the University of New Hampshire (UNH). The New Hampshire Geographically Referenced Analysis and Information Transfer System (NH GRANIT) is a cooperative project to create, maintain, and make available a statewide geographic data base serving the information needs of state, regional, and local decision-makers. A collaborative effort between the University of New Hampshire and the NH Office of State Planning (OSP), the core GRANIT System is housed at the UNH Institute for the Study of Earth, Oceans, and Space in Durham. The GRANIT approach to a statewide GIS depends upon the cooperative efforts of a host of agencies, collaborating on various elements of database design and construction as well as application development.

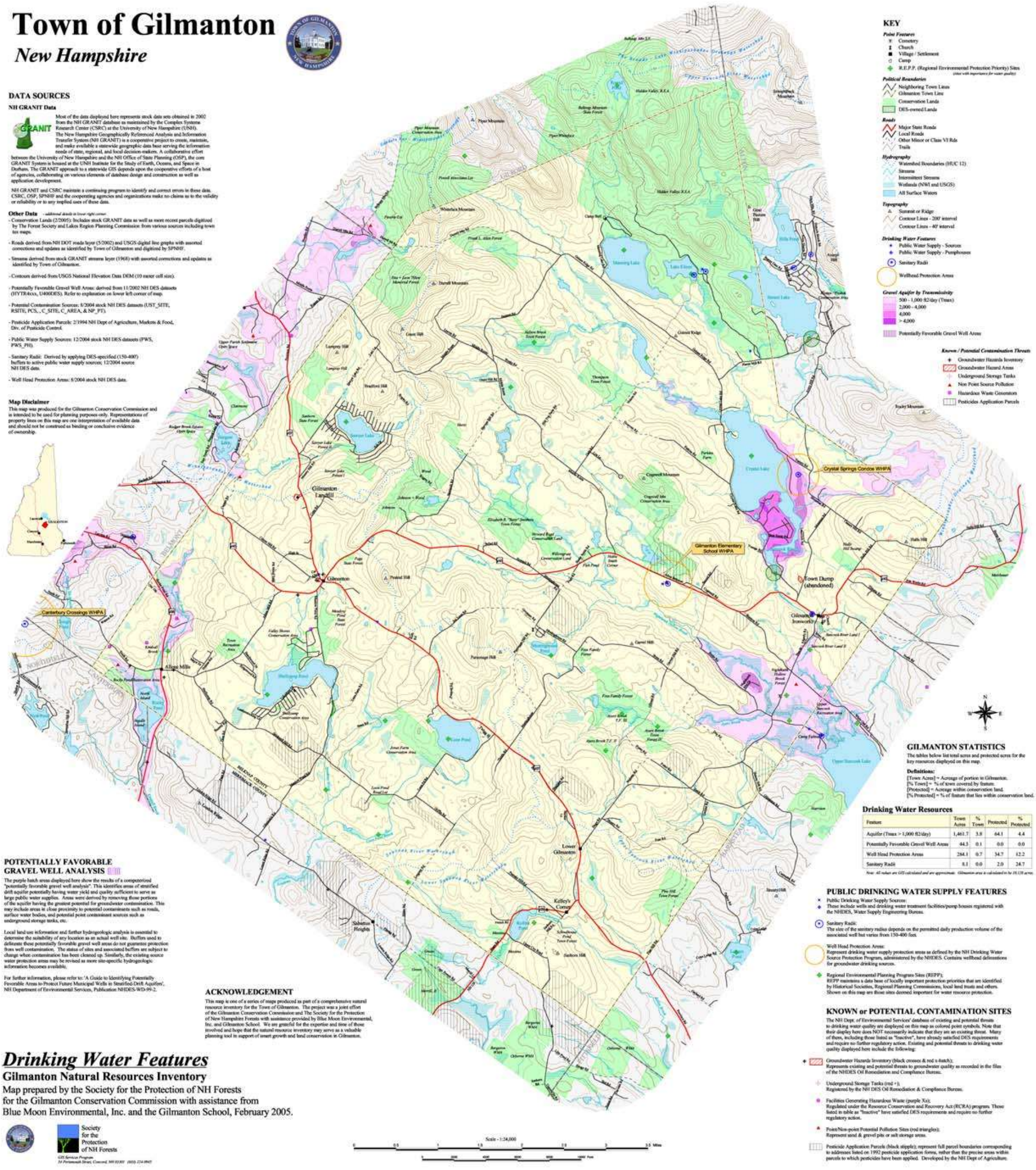
NH GRANIT and CSRC maintain a continuing program to identify and correct errors in these data. CSRC, OSP, SPNHF and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

Other Data *- additional details in lower right corner*

- Conservation Lands (2/2005): Includes stock GRANIT data as well as more recent parcels digitized by The Forest Society and Lakes Region Planning Commission from various sources including town tax maps.
- Roads derived from NH DOT roads layer (5/2002) and USGS digital line graphs with assorted corrections and updates as identified by Town of Gilmanton and digitized by SPNHF.
- Streams derived from stock GRANIT streams layer (1968) with assorted corrections and updates as identified by Town of Gilmanton.
- Contours derived from USGS National Elevation Data DEM (10 meter cell size).
- Potentially Favorable Gravel Well Areas: derived from 11/2002 NH DES datasets (HYTR4xxx, U400DES). Refer to explanation on lower left corner of map.
- Potential Contamination Sources: 8/2004 stock NH DES datasets (UST_SITE, RSITE, PCS, , C_SITE, C_AREA, & NP_PT).
- Pesticide Application Parcels: 2/1994 NH Dept of Agriculture, Markets & Food, Div. of Pesticide Control.
- Public Water Supply Sources: 12/2004 stock NH DES datasets (PWS, PWS_PH).
- Sanitary Radii: Derived by applying DES-specified (150-400') buffers to active public water supply sources; 12/2004 source NH DES data.
- Well Head Protection Areas: 8/2004 stock NH DES data.

Map Disclaimer

This map was produced for the Gilmanton Conservation Commission and is intended to be used for planning purposes only. Representations of property lines on this map are one interpretation of available data and should not be construed as binding or conclusive evidence of ownership.



KEY

Point Features
- Cemetery
- Church
- Village / Settlement
- Camp
- R.E.P.P. (Regional Environmental Protection Priority) Sites *(sites with importance for water quality)*

Political Boundaries
- Neighboring Town Lines
- Gilmanton Town Line
- Conservation Lands
- DES-owned Lands

Roads
- Major State Roads
- Local Roads
- Other Minor or Class VI Rds
- Trails

Hydrography
- Watershed Boundaries (HUC 12)
- Streams
- Intermittent Streams
- Wetlands (NWI and USGS)
- All Surface Waters

Topography
- Summit or Ridge
- Contour Lines - 200' interval
- Contour Lines - 40' interval

Drinking Water Features
- Public Water Supply - Sources
- Public Water Supply - Pumphouses
- Sanitary Radii
- Wellhead Protection Areas

Gravel Aquifer by Transmissivity
- 500 - 1,000 ft2/day (Tmax)
- 2,000 - 4,000
- 4,000
- > 4,000
- Potentially Favorable Gravel Well Areas

Known / Potential Contamination Threats
- Groundwater Hazards Inventory
- Groundwater Hazard Areas
- Underground Storage Tanks
- Non Point Source Pollution
- Hazardous Waste Generators
- Pesticides Application Parcels

GILMANTON STATISTICS

The tables below list total acres and protected acres for the key resources displayed on this map.

Definitions:
[Town Acres] = Acreage of portion in Gilmanton.
[% Town] = % of town covered by feature.
[Protected] = Acreage within conservation land.
[% Protected] = % of feature that lies within conservation land.

Drinking Water Resources

Feature	Town Acres	% Town	Protected	% Protected
Aquifer (Tmax > 1,000 ft2/day)	1,461.7	3.8	64.1	4.4
Potentially Favorable Gravel Well Areas	44.3	0.1	0.0	0.0
Well Head Protection Areas	284.1	0.7	34.7	12.2
Sanitary Radii	8.1	0.0	2.0	24.7

Note: All values are GIS calculated and are approximate. Gilmanton area is calculated to be 35,128 acres.

POTENTIALLY FAVORABLE GRAVEL WELL ANALYSIS

The purple batch areas displayed here show the results of a computerized "potentially favorable gravel well analysis". This identifies areas of stratified drift aquifer potentially having water yield and quality sufficient to serve as large public water supplies. Areas were derived by removing those portions of the aquifer having the greatest potential for groundwater contamination. This may include areas in close proximity to potential contaminants such as roads, surface water bodies, and potential point contaminant sources such as underground storage tanks, etc.

Local land use information and further hydrogeologic analysis is essential to determine the suitability of any location as an actual well site. Buffers used to delineate these potentially favorable gravel well areas do not guarantee protection from well contamination. The status of sites and associated buffers are subject to change when contamination has been cleaned up. Similarly, the existing source water protection areas may be revised as more site-specific hydrogeologic information becomes available.

For further information, please refer to: 'A Guide to Identifying Potentially Favorable Areas to Protect Future Municipal Wells in Stratified-Drift Aquifers', NH Department of Environmental Services, Publication NHDES-WD-99-2.

ACKNOWLEDGEMENT

This map is one of a series of maps produced as part of a comprehensive natural resource inventory for the Town of Gilmanton. The project was a joint effort of the Gilmanton Conservation Commission and The Society for the Protection of New Hampshire Forests with assistance provided by Blue Moon Environmental, Inc. and Gilmanton School. We are grateful for the expertise and time of those involved and hope that the natural resource inventory may serve as a valuable planning tool in support of smart growth and land conservation in Gilmanton.

PUBLIC DRINKING WATER SUPPLY FEATURES

- Public Drinking Water Supply Sources:
  These include wells and drinking water treatment facilities/pump houses registered with the NHDES, Water Supply Engineering Bureau.
- Sanitary Radii:
  The size of the sanitary radius depends on the permitted daily production volume of the associated well but varies from 150-400 feet.
- Well Head Protection Areas:
  Represent drinking water supply protection areas as defined by the NH Drinking Water Source Protection Program, administered by the NHDES. Contains wellhead delineations for groundwater drinking sources.
- Regional Environmental Planning Program Sites (REPP):
  REPP maintains a data base of locally important protection priorities that are identified by Historical Societies, Regional Planning Commissions, local land trusts and others. Shown on this map are those sites deemed important for water resource protection.

KNOWN or POTENTIAL CONTAMINATION SITES

The NH Dept. of Environmental Services' database of existing and potential threats to drinking water quality are displayed on this map as colored point symbols. Note that their display here does NOT necessarily indicate that they are an existing threat. Many of these, including those listed as "Inactive", have already satisfied DES requirements and require no further regulatory action. Existing and potential threats to drinking water quality displayed here include the following:

- Groundwater Hazards Inventory (black crosses & red x-hatch):
  Represents existing and potential threats to groundwater quality as recorded in the files of the NHDES Oil Remediation and Compliance Bureau.
- Underground Storage Tanks (red +):
  Registered by the NH DES Oil Remediation & Compliance Bureau.
- Facilities Generating Hazardous Waste (purple X's):
  Regulated under the Resource Conservation and Recovery Act (RCRA) program. Those listed in table as "Inactive" have satisfied DES requirements and require no further regulatory action.
- Point/Non-point Potential Pollution Sites (red triangles):
  Represent sand & gravel pits or salt storage areas.
- Pesticide Application Parcels (black stipple); represent full parcel boundaries corresponding to addresses listed on 1992 pesticide application forms, rather than the precise areas within parcels to which pesticides have been applied. Developed by the NH Dept of Agriculture.

Drinking Water Features

Gilmanton Natural Resources Inventory

Map prepared by the Society for the Protection of NH Forests
for the Gilmanton Conservation Commission with assistance from
Blue Moon Environmental, Inc. and the Gilmanton School, February 2005.

Society for the Protection of NH Forests
GIS Service Program
54 Portsmouth Street, Concord, NH 03301 (603) 224-9945

Scale - 1:24,000

7.0 Wetlands

Wetlands adjacent to Rollins Pond ~ Photo Courtesy of Thomie Dombrowski

Greater familiarity with marshes on the part of more people could give man a truer and more wholesome view of himself in relation to Nature. In marshes, Life's undercurrents and unknowns and evolutionary changes are exemplified with a high degree of independence from human dominance as long as the marshes remain in marshy condition. They have their own life-rich genuineness and reflect forces that are much older, much more permanent, and much mightier than man. **~Paul L. Errington, "Of Men and Marshes"**

Since this country's founding, the United States has lost at least half of its total wetlands. Since 1995, we have lost 1,250,000 acres of wetlands. Between 2004 and 2009, the U.S. lost 360,000 acres. The study discussing these losses was highlighted in a 2013 Washington Post article by Darryl Fears titled "Study says U.S. Can't Keep Up with Loss of Wetlands" that discussed a study by Tom Dahl, Status and Trends of Wetlands in the Coastal Watersheds of the Coterminous United States.

This section will discuss wetlands, their values and threats to their continued existence with particular emphasis on wetlands in Gilmanton. Wetlands, as defined by the Environmental Protection Agency, the NH Department of Environmental Services and the Gilmanton Zoning Ordinance are those areas that are inundated or saturated by surface or groundwaters at a frequency and duration sufficient to support and that under normal circumstances do support a prevalence of vegetation adapted for life in saturated soil conditions.

7.1 Identifying a Wetland

Wetlands are areas where water determines the type of plants and soil that are present. To identify a wetland, we usually refer to the "3 H's" which are: Hydrophytes - wetland vegetation; Hydrology - the branch of science concerned with the properties of the earth's water, and especially its movement in relation to land; and Hydric soil - a soil that formed

under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic (an absence of free oxygen) conditions in the upper part.

Wetlands are an integral part of Gilmanton's natural resources. They are important for removing excess nutrients and sediment from the water, slowing and storing floodwaters, promoting groundwater infiltration, and providing habitat for a variety of vegetation and animal life. In addition, wetlands provide recreational, educational, and research opportunities. They add to the visual resources of the Town, especially in the fall when the red maples turn scarlet. Wetlands are most often found along streams and adjacent to ponds and lakes. They can be found in clustered complexes that are of great value. Vernal pools are a special type of wetland that dry out completely in the summer and have no fish population. They are especially valuable for amphibian reproduction, but have not been mapped for Gilmanton. Please see Section 8.0 of this report for more information on vernal pools.

There is a diversity of wetland types in Gilmanton, including areas of open water with emergent vegetation such as cattails, forested wetlands, and scrub-shrub wetlands. The principal types of wetlands with standing water in the spring have been mapped from aerial photos by the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service. The NWI wetlands do not include all wetlands, particularly those that do not typically have standing water in the spring. Therefore, this is an underestimate of the amount of wetlands. The more significant wetlands, however, are included in the NWI.

The NWI classification codes for Gilmanton are shown on the Surface Water Features Map. These codes describe the dominant vegetation type as well as the hydrology of each wetland. For the purposes of this map, these codes were categorized by the dominant vegetation type.

- **Emergent wetlands** are those wetlands with non-woody vegetation that grows above the land and/or water surface. Cattail marshes are one example of emergent wetlands.
- **Forested deciduous wetlands** are wetlands with deciduous trees as the dominant vegetation type. Red maple swamps are one example of forested – deciduous wetlands.
- **Forested – evergreen wetlands** are wetlands with evergreen trees as the dominant vegetation type. Hemlock, balsam fir and white cedar are examples of evergreen trees that might be dominant in a forested – evergreen wetland.
- **Forested – dead wetlands** are wetlands where a once forested wetland has been flooded (usually by a beaver impoundment) and the standing trees are dead. These wetland types often become nesting areas for great blue herons until the trees fall down and the impounded water becomes densely vegetated.
- **Deciduous – shrub wetlands** are wetlands where the dominant form of vegetation is deciduous shrubs. Highbush blueberry, silky dogwood, sweet gale and winterberry are common deciduous shrubs in Gilmanton wetlands.
- **Evergreen – shrub wetlands** are relatively uncommon. These wetland types are dominated by shrubs that do not lose their leaves. Leatherleaf and labrador tea are broadleaf evergreen shrubs. Other evergreen shrubs might be balsam fir, black spruce and other evergreen trees that have not yet reached tree size.

- **Unconsolidated bottom wetlands** are those wetlands with open water over most of the surface area of the wetland. Vegetation may grow in these wetlands below the surface of the water and/or may float on the water but is typically not visible early in the growing season when the aerial photography used to classify wetland types is taken.

The areas and number of each wetland type in Gilmanton are shown in Table 5. The wetlands count does not reflect separate wetlands, but patches of wetlands classified as a particular type. The total area for NWI wetlands in Gilmanton is 1679 acres or 4.4% of the town's land and water area.

Table 5. National Wetland Inventory of Wetlands in Gilmanton

Type	Acres
Emergent	522
Forested, deciduous	287
Forested, evergreen	186
Forested, dead/beaver impoundment	89
Shrub, deciduous	287
Shrub, evergreen	3
Unconsolidated bottom	305
Total	1,679

In Gilmanton, as elsewhere, wetlands are being filled in, particularly for building roads and driveways to access building sites. Development has additional negative impacts on wetlands through increased runoff, erosion and sedimentation, fertilizers, and pesticides on lawn and garden areas and removal of natural vegetation in adjacent upland areas. Table 6 below shows the increase in new residential construction since 2016.

Table 6. Residential Building Permits in Gilmanton

Year	2016	2017	2018	2019	2020	2021	2022
Permits	13	18	16	17	13	23	23

7.2 Significant Wetlands

A comparative study of the functions and values of the different wetlands in Gilmanton has not been undertaken. Such an analysis would be necessary to prioritize significant wetlands in the Town and to provide the data necessary to designate some wetlands as Prime under RSA 482-A: 15. These wetlands, when designated as such, receive special consideration from the Wetlands Bureau of NHDES. When a wetland is designated as Prime by a community, it is recognized as a valued natural resource, and protected as such.

Although Gilmanton's wetlands have not been carefully studied, much information is available from the National Wetland Inventory maps. Based on these maps, the largest wetlands and wetland complexes in Gilmanton are shown on the Surface Water Features Map, and are found in the areas listed in Table 7. It is important to note that all of these wetlands are located in the headwaters of larger watersheds and thus, the effects of

management policies for these wetlands will have impacts in other towns within these larger watersheds especially with respect to the quality of surface waters; aquifers and public drinking supplies.

Table 7. Gilmanton's Large Wetlands and Wetland Complexes	
Name	**Location**
Ayers Brook Wetlands	Upper reaches of Ayers Brook near the Pleasant Valley Farm and Ayers Brook Town Forest
Bean Road Wetlands	On fork of Academy Brook and including wetlands to the southwest of the Jones Farm Conservation Area
Beaver Pond and Associated Wetlands	On Rte. 140 opposite school including wetlands to the southwest of the Cogswell Mountain Conservation Area
Hidden Valley Wetlands Complex	Below the outlets from Manning Lake and Lake Eileen
Kelley Meadows/NH Route 107	Large beaver meadow northeast of Kelley's Corner
Kimball Brook Wetlands	Along length of brook in Gilmanton near Rte. 107
Nelson Brook Wetlands Complex	Tributaries and marsh feeding into Crystal Lake from northwest
Nighthawk Hollow Brook Wetlands Complex	North of Rte. 140 along most of brook extending to the beaver pond on Middle Route
Parsons Hill Wetland	South of Rte. 107 near the Barnstead town line
Suncook Flats Wetlands Complex	Along lower sections of Ayers Brook and Nighthawk Hollow Brook near Stage Road
Town Line Wetlands	Route 129 near Loudon. Part can be seen from the Messina CE

7.3 Wetland Buffers

In addition to retaining the wetland itself, the undeveloped uplands surrounding the wetland are also essential for a healthy wetland. Maintaining a buffer of a naturally vegetated upland area adjacent to wetlands and surface waters is important to reduce the adverse effects of human activity on these water resources. Vegetation in buffers intercepts rainfall, slows meltwater and promotes infiltration. Even unprotected small, intermittent streams can be sources of sediment and can contribute to large fluctuations in water levels downstream. In addition, a vegetated buffer provides habitat for species dependent on the wetland system and travel corridors for larger mammals. A minimum upland buffer width around wetlands and other shorelines of 100 feet is recommended and 300 feet is desirable to maintain good habitat.[1]

Shorelines of lakes, ponds, rivers and streams are called riparian areas, corridors, or buffers. Wider, forested buffers along these areas are more effective than narrow, grassy ones.

[1]Chase, Victoria et. Als Buffers for Wetlands and Surface Waters, Office of State Planning, Audubon Society of New Hampshire, UNH Cooperative Extension, 1995, revised 1997.

Table 8. Riparian Buffer Requirements	
Function	**Buffer Width in Feet**
Stabilize banks	35-50
Filter sediment	150
Filter dissolved nutrients and pesticides	125
Protect fisheries	75
Protect wildlife	300+
Flood control	200

***Introduction to Riparian Buffers*; Connecticut River Joint Commission for NH and VT, September, 2000, updated 2018.**

It is important to note that the buffer should be wider if the adjacent land is sloped, if the land use is intensive, if the soils are erodible, if the land is a floodplain, and if the stream or river naturally meanders. Our key to protecting wetlands is education and understanding of wetland ecology.

7.4 Values of Wetlands

Size: Many think the adage "the bigger, the better" applies to wetlands. We've mentioned that wetlands restore groundwater quality. Smaller wetlands function, in this specific aspect, in a manner equal to or greater than larger wetlands. Unfortunately, a small wetland's importance is overlooked and as a result, these wetlands are destroyed. A small wetland is usually part of a group of other small wetlands that, in a sense, work together to provide a benefit to that specific environment. When any small wetland is destroyed, its landscape is also altered. Hopefully, the value of smaller wetlands will be recognized and their preservation will follow.

Economic Benefits: Millions of dollars are saved annually when wetlands are allowed to function naturally in flood protection, erosion control, and pollution abatement. Recreational wetland opportunities are available for individuals who wish to hike, snowshoe, ski, fish, hunt, canoe, birdwatch, or nature photography. Tourism activities provide income through the sales of licenses, permits, and associated revenue. Wetland plants and animals have great potential for their pharmaceutical uses. Because of the biological diversity found in wetlands there is the potential for discovering vaccines and medicines.

Educational and Scientific Value: Wetlands can be used as an "outdoor classroom" for students and provide them with hands-on knowledge of nature. The Gilmanton School is adjacent to a wetland on the Perkins Conservation Easement and uses it regularly. Boy Scouts have built a viewing stand overlooking the beaver pond and wetland. Wetlands provide an area for vegetation surveys, water quality research, and plant and wildlife studies, especially if the wetland contains rare, threatened, or endangered species.

Uniqueness and Heritage: Wetlands can be a source of information about our cultural heritage. Wetlands provide critical habitat for unique and endangered plants, and/or animals and geologic features. Poets, painters, musicians, and photographers are drawn to wetlands for their inspiration.

Visual Quality and Aesthetics: Wetlands provide unusual aesthetic quality, green space, natural water features, and views for which homeowners are willing to pay, thereby increasing the property values of adjacent land.

7.5 Threats to a Wetland

Lack of Knowledge and Understanding: The most apparent threat to wetlands is that their function will go unrecognized. This lack of knowledge can lead to further destruction of wetlands, upon which our environments depend. Traditionally, wetlands have been considered as mosquito-infested, useless, and wasted areas. Consequently, one half of all wetlands present in colonial time have been lost, mostly from filling and draining. However, when wetlands are allowed to function naturally without human intervention, mosquito populations will plummet as much as 90%. Wetlands naturally support birds, mammals, and fish that thrive on mosquitoes. Currently, most wetlands are lost to agriculture, land development, and road/highway construction.

Invasive Species in Wetlands: Native species are those species that are thought to be indigenous to a region. Native species were present when the Colonists arrived or are those that arrived without human assistance. Invasive species are species not present in Colonial times that establish themselves in a native plant community and push out the native plants. The following are among the most destructive wetlands invasive species we should be aware of:

- **Purple loosestrife, (*Lythrum salicaria)*,** once used in home landscapes, but is now an invasive, non-native plant that is currently invading millions of acres of wetlands. Each plant can produce up to two million seeds annually that can remain viable in the soil for many years. Despite its beautiful appearance, Purple loosestrife quickly takes over wetland areas and chokes out the native plants. In doing so, it deprives native wildlife of habitat and food sources. New Hampshire is one of many states that have banned the sale of Purple loosestrife.
- **Common Reed, (*Phragmites commonalis)*** is believed to be a native that has become invasive because increased development and agriculture in and around wetlands has altered natural conditions. It is also believed it has hybridized with the European non-native ***Phragmites australis*** that has no natural enemies. Phragmites grow stems up to 12 feet in height and is found in both freshwater and coastal saltmarsh wetlands and roadside ditches. It was a naturally occurring part of many wetlands where it provided water filtration, food and cover for several wildlife species. However, due to its invasiveness and the altered landscapes it is resulting in the decline of many species much more beneficial to wildlife.
- ***Yellow Flag Iris, (Iris pseudacorus*)** has been popular in landscaping uses along pond edges and stream banks. Unfortunately, it has escaped the cultivated gardens and is invading natural wetlands where it displaces the native irises. There is a small wetland on Stage Road and the brook behind the Academy where this can be seen.
- **Oriental Bittersweet, *(Celastrus orbiculatus),*** is an ornamental plant that was introduced from Japan, China and Korea. It has escaped into wetlands and edges of marshes as well as fields, forests and meadows. Oriental Bittersweet is easily confused with our native Bittersweet *(Celastris scandens)*, which is not invasive.

Oriental Bittersweet is a vine that grows up to 60 feet and chokes out all other vegetation by wrapping itself around native plants, trees and shrubs and strangles them.

Wetlands are vulnerable to climate change: Because of their position where land and waters meet, wetlands are at risk of damage from climate change. Effects of climate change on wetlands may include:

- Loss of carbon stored in soil
- Changes in soil structure
- More frequent drying or flooding
- Changes in plant or animal communities
- Changes in timing and amount of water available to wetlands fed by snow melt. [2]

Most of the carbon stored in wetlands is in the soil, where carbon cycling and microbial processes take a long time to develop. For example, the organic soil in peatlands can take thousands of years to develop - it can take up to 250 years for just one inch of peat to accumulate.[3] Disturbance of those systems can result in loss of the carbon stored in those soils to the atmosphere.[4] It is estimated that oxidation of disturbed organic soil contributes a substantial amount of CO_2 to the atmosphere.[2] Undisturbed wetlands store nearly twice as much carbon as wetlands disturbed by human activities. Warmer temperatures and changes in precipitation can also reduce carbon stored in wetland soils.[2] The combination of wetland disturbance from human activities and changes in climate may have greater impacts on wetland functions than either stressor would alone.

Wetlands that rarely dry out are expected to shift to more frequent drying in some areas, and wetlands that are frequently dry may be lost entirely. In other areas where precipitation is expected to increase, or the timing is expected to change, wetlands that occasionally dry out may become wetter.

The changes to wetlands that may happen with climate change can alter water quality, water quantity, and habitat functions. The response of individual wetlands to climate change will depend on:

- Exposure to altered climate conditions
- Sensitivity to those changes
- Potential impacts from exposure and sensitivity
- Capacity to adapt

7.6 Wetland Recommendations

- Include a Wetland Ordinance in the Gilmanton Zoning Ordinance with provisions for a naturally vegetated buffer adjacent to wetlands, vernal pools, and surface waters

(Source: Wetlands & climate change - Washington State Department of Ecology)

[2]Chase, Victoria et. Als Buffers for Wetlands and Surface Waters, Office of State Planning, Audubon Society of New Hampshire, UNH Cooperative Extension, 1995, revised 1997.

[3]Significant portions of this revised and updated section on wetlands is taken from Paula Gilman, Living With Wetlands, for her Wetlands course at Southern Maine University.

[4]Moomaw, W. R., Chmura, G. L., Davies, G. T., Finlayson, C. M., Middleton, B. A., Natali, S. M., . . . Sutton-Grier, A. E. (2018). Wetlands in a changing climate: science, policy and management. Wetlands, 38(2), 183-205).

and with protection of steep slopes adjacent to wetlands. Some issues to consider when drafting such an ordinance include:

1. Which wetlands and water resources to include?
2. What should be surrounded by a protective buffer?
3. How large should the buffer be?
4. Should the buffer size vary depending upon the use?
   a. Should the buffer size vary depending on the significance of the wetland or water resource?
5. What uses and activities should be permitted in the buffer?
6. What should be done about pre-existing uses and lots?
7. What should be done about exceptions and who makes that decision?

- Educate the public as to what they can do to protect wetlands and why, through literature, and wetlands walks. This should include the importance of reducing nonpoint source pollution from sedimentation, fertilizers, pesticides, and hazardous wastes.
- Continue to work with the Wetlands Bureau of NHDES to enforce State laws and rules.
- Conduct a comparative study of wetlands in Gilmanton.
- Amend the Gilmanton Subdivision regulations to require that wetlands be mapped by a certified wetland scientist for all subdivision applications.
- Amend the Gilmanton Site Plan regulations to require that wetlands be mapped by a certified wetland scientist for all site plan applications.

What Can You Do to Protect Wetlands?

Direct Approach:

1. Create a 100 foot buffer zone between your land and a wetland with plantings of native plants, shrubs and trees. (Gilmanton's current buffer is 50 feet). Plants hold the soil in place and keep pesticides and nutrients from polluting the wetland;
2. Don't place fill materials into wetlands;
3. Avoid using chemical fertilizers or pesticides that can percolate into the groundwater;
4. Choose natural pesticides and use compost and organic nutrients for your yard;
5. Don't drain wetlands;
6. Pump septic tanks regularly every 2-5 years and be certain your leach field is functioning properly;
7. Don't remove or tamper with wetland vegetation;
8. Dispose of toxic substances properly.

Indirect Approach:

1. Learn more about wetlands. Check out Gilmanton's libraries, bookstores, DES, and online;
2. Get involved with organizations such as the Gilmanton Conservation Commission, Gilmanton Land Trust, The Nature Conservancy, or the Audubon Society;
3. Remember little wetlands have big advantages;
4. Simply stop……and look. Observe the wetland that may be bordering your property or by the side of the road. You may be surprised at what you see.

8.0 Vernal Pools

Vernal Pool in Gilmanton ~ Photo Courtesy of Cathy Merrifield

"Being dry for most of the year, vernal pools are uninhabitable by fish and are critical breeding places for a small group of invertebrates and amphibians: fairy shrimp, wood frogs, and spotted, Jefferson, blue-spotted, and marbled salamanders. While many other animals make significant use of vernal pools, the life cycles of these six species make them dependent on seasonal wetlands. They are considered indicator species; the presence of any one of them in a seasonal wetland identifies it as a vernal pool habitat."

***~David Carroll,* Artist-Naturalist and Writer**

The State of New Hampshire defines a vernal pool as: "Vernal pool" means a surface water or wetland, including an area intentionally created for purposes of compensatory mitigation, that provides breeding habitat for amphibians and invertebrates that have adapted to the unique environments provided by such pools and that:

(a) Is not the result of on-going anthropogenic activities that are not intended to provide compensatory mitigation, including but not limited to:

(1) Gravel pit operations in a pit that has been mined at least every other year; and

(2) Logging and agricultural operations conducted in accordance with all applicable New Hampshire statutes and rules; and

(b) Typically has the following characteristics:

(1) Cycles annually from flooded to dry conditions, although the hydroperiod, size, and shape of the pool might vary from year to year;

(2) Forms in a shallow depression or basin;

(3) Has no permanently flowing outlet;

(4) Holds water for at least 2 continuous months following spring ice-out;

(5) Lacks a viable fish population; and

(6) Supports one or more primary vernal pool indicators, or 3 or more secondary vernal pool indicators. Env-Wt 104.44.

Little is known about the number and location of vernal pools in Gilmanton. Given their importance for maintaining biodiversity, this is unfortunate. One of the problems is that vernal pools are not easy to identify for most of us and people need to know what to look for. Although vernal pools may vary in size from a few square feet in area to over a number of acres and may be located in a number of different sites – woods, floodplains or gravel pits—they do have certain features in common. Although they appear in the same place year after year they are defined as a temporary body of water because most dry up in hot weather or times of drought. All of them are contained bodies of water without any permanent outflow.[1] They do not support fish and are therefore excellent breeding grounds for species whose eggs would provide an excellent food source were fish present. Some species are so dependent on vernal pools for their survival that their very presence is taken to establish that a particular basin of water is indeed a vernal pool. Not surprisingly, these are known as indicator species. Primary vernal pool indicator species in New Hampshire means the presence or physical evidence of breeding by marbled salamander, wood frog, spotted salamander, Jefferson-blue spotted salamander complex, or fairy shrimp; Env-Wt 103.64.

An essential inhabitant of vernal pools is the fairy shrimp. These are tiny crustaceans that are found throughout the country. They are present as soon as a vernal pool thaws and die off at the start of warm weather, leaving their eggs on the floor of the pool. These are designed to survive drying out, intense heat, freezing, and even being eaten by birds and, despite everything, will hatch the following spring when the pool is once again filled with water. Should there be a dry spell that prevents this from occurring, the eggs are prepared to wait out the weather.

Wood Frog ~ Photo Courtesy of Thomie Dombrowski

[1]Information for this segment of the Natural Resource Inventory comes from *Identification and Documentation of Vernal Pools in New Hampshire*, ed. Anne Tappan (New Hampshire Fish and Game Department Nongame and Endangered Wildlife Program, 1997).

Some amphibians are also indicator species of vernal pools. One such species in New Hampshire is the Wood Frog. Wood frogs are one of the earliest creatures to be seen in the spring often appearing in March and their early mating makes it possible for the eggs to develop before the pool dries up. The wood frog call sounds very much like the quacking of ducks and is an early sign of spring. This frog is brown with a black mask, and is often seen in the woods during the summer.

Blue-Spotted Salamander ~ Photo Courtesy of Thomie Dombrowski

The Spotted salamander is another indicator species in New Hampshire. A large dark salamander measuring 4.5-7.5 inches. Has up to 50 round yellow or orange spots arranged irregularly down the back and sides. Base color is generally black or bluish-black. **Commonly Confused Species:** Blue-spotted salamander.

Habitat: Mixed woodlands with slow moving streams, swamps, or vernal pools. Adults spend their time underground or under logs, boards, or stones.

Life History: Warm spring nights trigger movements to breeding pools where jelly masses containing 100-200 eggs are attached to submerged sticks and vegetation. Usually breeds in pools that do not contain predatory fish. Hibernate in the ground or under rotting stumps.

Conservation Threats: Loss of upland and vernal pool habitat, road mortality during migratory seasons.

They lay their eggs in vernal pools as well and migrations of salamanders to breeding areas usually take place after the first heavy rain in early spring. Although both the spotted salamander and the wood frog may be found mating in more permanent waters, eggs laid in vernal pools have the best chance of surviving. The spotted salamander will often lay her eggs in October and, if the pool is still dry, will stay with them keeping guard until Fall rains arrive.

Many other species use vernal pools although they do not have the same dependency upon them. Among the invertebrates, these are clam shrimp, fingernail clams, and amphibious snails, caddis flies and other aquatic insects. Among the amphibians the species are four-toed salamander, Eastern newt, spring peeper, American toad, the gray treefrog, and the green frog. Although no reptile is among the indicator species, the spotted turtle, the earliest turtle to appear in the spring, sometimes moving about in March, often uses such pools as a source of food and a place for courtship and mating. Blanding's turtles have been known to overwinter in vernal pools. Both of these species are endangered in New Hampshire and

their appearance is of special interest to the Nongame and Endangered Species Division of New Hampshire Fish & Game. In fact, if you think you may have a vernal pool on your property, it is possible to obtain a documentation form from Fish & Game and they would welcome a report on the sighting of any of the reptiles or amphibians mentioned here. Observations can be submitted online, by email and through the USPS.

According to David Carroll, *Swampwalker's Journal: A Wetlands Year, at 8.*"...vernal pool habitats are defined by a common key set of ecological parameters: they lie within confined depressions that lack a permanent outlet stream; have seasonal, impermanent flood periods that generally last from two to five months; dry out completely most years, usually by late summer; are free of fish; and, most significantly, support the life cycles of animals that are utterly dependent upon this habitat for the perpetuation of their species. The pools define the animals, and these animals in turn define the pools."

If you think you have a vernal pool on your property, try to identify it while causing as little disturbance as possible. A trip to the pool at night should enable you to hear the wood frogs quacking in early spring and following a spotted salamander migration will eventually lead you to such a pool. Day time exploration would consist of finding the eggs of these amphibians. Wood frog eggs lack a surrounding gelatinous capsule and do not look as though they are holding a consolidated shape. They are attached to twigs just below the surface of the pond. Salamander eggs are surrounded by a firm jelly-like substance with individual eggs visible inside. The egg mass is attached to sticks, grass, weeds or reeds usually eight to ten inches below the surface. The upper part of the egg is dark brown or gray and the lower part dirty white or dull yellow. Adults of these species may also be seen. It is, of course, essential to disturb the animals as little as possible in your effort to identify a vernal pool. In reporting such findings to the Nongame and Endangered Wildlife Program at 2 Hazen Drive in Concord, (603) 271-2462, photographs of the site would be enormously helpful. For more information see, https://wildlife.state.nh.us/nongame/documents/vernal-pool-manual.pdf

8.1 Vernal Pool Recommendations

Vernal pools, which are typically wetland oases set in terrestrial landscapes, enhance the diversity and abundance of species in an area. Vernal pools provide a unique type of wildlife habitat and are crucial breeding grounds for a number of amphibians. As such, efforts should be made to protect this habitat and the species that it supports. Some methods to accomplish this goal include:

- Identify and map vernal pools on subdivision plans and site plans in order to provide an opportunity to mitigate the impacts to these sensitive areas;
- Education;
- Keep landings, roads and trails out of vernal pools and the area adjacent to them. Busy roads near a vernal pool can lead to massive annual mortality and local extinctions;
- Maintain shade around a vernal pool in order to keep it from drying up too quickly and to maintain water temperatures;
- Keep slash out of a vernal pool during forestry operations and during development;

- Maintain the upland (non-wetland) habitat where many vernal pool dependent species spend most of their life cycle.

9.0 Forest Resources

Top of Pine Hill, Lower Gilmanton ~ Photo Courtesy of Thomie Dombrowski

"Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop off like autumn leaves."

~John Muir, Farmer, inventor, sheepherder, naturalist, explorer, writer, and conservationist.

Gilmanton's forests provide a host of social, economic and ecological values including but not limited to timber, wildlife habitat, clean water, scenic beauty and recreation. The forests absorb rainwater, increase groundwater infiltration, and buffer surface waters from sedimentation and contamination. Near roads and homes, trees cool summer temperatures by 10 degrees or more; break winter winds; and filter dust and pollutants from the air. Forests host scenic recreational trails and hunting grounds. Our expansive and healthy forests underpin the state's thriving tourist industry and attract seasonal residents. In addition, well-managed forests provide a sustainable supply of maple syrup, home firewood, commercial wood products and jobs needed by New Hampshire residents.

9.1 Forest Cover

A forest is not merely a stand of trees. It is the total assemblage of trees; the substrate (soil or rock) on which they depend for anchorage and support, nutrition, moisture, and supply of oxygen to the roots; the other plants with which they interact in terms of mutual shelter, competition, benefit or antagonism; the animals that feed on, shelter under, or benefit the plants; the microorganisms that exert direct or indirect beneficial or antagonistic effects on

the trees and other living organisms; and the soil and atmospheric climate, including fire and moisture, that influence the distribution and abundance of all the organisms in the forest.

Several forest types comprise a forest. Forest types are distinctive associations or communities of trees, shrubs, and herbaceous plants. They are named for the predominant tree species occurring in the type. Common forest types in Gilmanton include White Pine; Northern Hardwood (sugar maple, beech, yellow birch, red maple, white ash and smaller amounts of other species); Spruce-Fir, Red Oak, Hemlock, and Aspen-Birch. A forest type may be dominated by a single tree species or by several species growing together.

Gilmanton's forests provide us with wood and food products, wildlife, scenic beauty, a modified microclimate, stabilization of steep slopes and snowpacks, the control of water flows, the creation and maintenance of stream habitat for aquatic animals, and recreation. In addition, forests constitute a major storage of carbon not only in the trees themselves, but in the forest soils as well. Most importantly, forests provide us with biodiversity.

NH is the second most forested state in the US, trailing Maine. Gilmanton is approximately 84% forested which is greater than the state as a whole, which is currently 81%.[1] Many of Gilmanton's forests have grown from abandoned agricultural land and are now mature. However, due to increased development, the area of Gilmanton's forests is decreasing.

An analysis of the most recent land cover data produces a smaller figure for the percentage of the Town that is forested. The percentages for various forest types are shown in Table 10.

Table 9. Land Cover for New Hampshire

Class Description	Total Acres
Barren Land	27,180.6
Cultivated Crops	16,028.2
Deciduous Forest	1,303,768.2
Developed, High Intensity	21,842.4
Developed, Low Intensity	149,544.7
Developed, Medium Intensity	78,858.2
Developed, Open Space	242,758.7
Emergent Herbaceous Wetlands	35,515.3
Evergreen Forest	1,129,933.4
Hay/Pasture	167,239.9
Herbaceous	68,888.9
Mixed Forest	1,931,088.9
Open Water	202,695.7
Shrub/Scrub	191,787.9
Unclassified	101.7
Woody Wetlands	373,314.

[1]NH Division of Forest and Lands

Table 10. Forest Land Cover		
Land Cover	**Acreage**	**Percentage**
Mixed Forest	13,087.69	34.33
Beech/Oak	8,386.42	22.00
Other Hardwoods	4,365.10	11.45
White/Red Pine	3,118.59	8.18
Hemlock	967.75	2.54
Spruce/Fir	595.86	1.56
Paper Birch/Aspen	184.24	0.48
Forested Wetlands	122.22	0.32
Pitch Pine	3.41	0.01
Total	**30,831.28**	**80.86**

9.2 Forestry

Forestry provides an important revenue source to the town, and if forests are sustainably managed, this can be an ongoing, stable income stream for landowners as well as the town.

In 2003, Intents to Cut forms were filed for approximately 1035 acres in Gilmanton. The Town receives a timber tax which is based on 10% of the value of timber harvested. Table 11 shows the timber tax received in each of the past 6 years.

Table 11. Timber Tax Revenues		
Year	**Acreage Cut (acres)**	**Amount**
2017	411	$32,832
2018	419	$36,090
2019	539	$24,266
2020	354	$36,352
2021	509	$17,381
2022	659.5	$24,938

Responsible timber harvesting helps landowners afford to keep their forests as forests and provide many benefits for Gilmanton as well. Gilmanton has 16 certified Tree Farms encompassing 5,415 acres. In addition, Gilmanton has 3 Pioneer TFs, (including one in Gilmanton Iron Works) encompassing 610 acres. Pioneers are not considered certified, but they are still in the program - they receive Tree Farm newsletters. A Tree Farm is a privately owned forest managed to produce timber with added benefits of improved wildlife habitat, water quality, recreation, and scenic values. Town Forests and other publicly owned land may also be certified as a Tree Farm. To qualify, a landowner must:

- Dedicate at least 10 acres to growing and harvesting forest products;
- Have a written plan for the future management of their forest;

- Follow management recommendations prescribed by a licensed forester;
- Demonstrate a commitment to stewardship of their forest for multiple values.

In addition to land that has been officially certified as a Tree Farm, there are many acres that are actively managed under a forest management plan written by a licensed professional forester. Foresters provide a variety of services to landowners including management plan preparation, timber appraisals, timber sale administration, wildlife habitat improvement, boundary marking, timber stand improvement, and recreational and aesthetic improvements. A list of licensed professional foresters is available from the UNH Cooperative Extension office.

9.3 Forest Soils

Forest soils have a range of productivity for different types of tree species and suitability for management. Forest Soils in New Hampshire have been classified for their productive value and operability. The IA, IB and IC soils are the most valuable for ecologically sensitive and economically viable forest management.

"Keeping forests as forests, encouraging sustainable management practices that provide renewable wood resources while enhancing carbon sequestration and storage, increasing resilience, and fostering biodiversity are the wise use principles of our mission today."
~ Jack Savage, President, Society for the Protection of New Hampshire Forests.

Table 12. NH Forest Soils Classification

Soil Class	Description
IA	Deeper, loamy soils, moderately to well-drained (best northern hardwood sites)
IB	Sandy or loamy soils, moderately to well-drained (mixed hardwood sites)
IC	Outwash sands and gravels (best pine sites)
IIA	IA and IB soils with limitations such as steepness, shallow to bedrock or rocky
IIB	Poorly drained soils
Unclassified	Unclassified: Muck and peat, rock outcrop, gravel pits, marsh

10.0 Town Forests

Thompson Town Forest ~ Photo Courtesy Thomie Dombrowski

"To me a lush carpet of pine needles or spongy grass is more welcome than the most luxurious Persian rug." **~Helen Keller**

Gilmanton is fortunate to have 8 Town Forests totaling approximately 833.736 acres. In addition to the Town Forests, Meadow Pond State Forest, Page State Forest, Sanborn State Forest and a part of Belknap Mountain State Forest are located within the Town. Gilmanton's Town Forests are listed in Table 13 according to acreage.

Table 13. Gilmanton's Town Forests	
Town Forest	**Size in Acres**
Elizabeth R. "Betty" Smithers Town Forest	253
Pine Hill Town Forest	141
Thompson Town Forest	122.7
Ayers Brook Town Forest IV	55
Nelson Brook Town Forest	47
Ayers Brook Town Forest II	21
Ayers Brook Town Forest III	5
Walch Family Town Forest	189.036

10.1 Management Plans

Forest management plans outline a landowner's goals for a parcel, including but not limited to forest products, recreation, wildlife, and forest health. For Town Forests specifically, the main goals of management plans are to promote forest health; protect sensitive areas such as wetlands and vernal pools; and improve wildlife habitat and recreational opportunities.

Town Forest management plans include a schedule of management priorities. Specific recommendations are given for each Town Forest. The plans are reviewed and updated every 5-10 years, or on an as-needed basis due to changes in forest health. Public workshops are presented each time a Town Forest management plan is revised or timber harvests are planned.

10.2 Goals and Objectives

The Commission has established the following goals and objectives for the Town Forests:

A. Maintain the structural, functional, and compositional integrity of the forest as an ecosystem through:

- Maintenance of soil productivity;
- Protection of water quality, wetlands, and riparian zones;
- Maintenance or improvement of the overall quality of forest products;
- Conservation of scenic quality;
- Protection of unique or fragile natural areas;
- Protection of unique historic and cultural features;
- Conservation of native plant and animal species and their habitat.

B. Meet the diverse needs of the human community through:

- Sustainable flow of timber, pulpwood and other forest products;
- Improvement of the overall quality of the timber resource as a foundation of more value added opportunities;
- Addressing aesthetic impacts of forest harvesting;
- Continuation of opportunities for traditional recreation.

10.3 Town Forest Recommendations

- Ensure access and parking for public use.
- Prepare Forest Management Plans by a licensed forester for all but the smallest of the Town Forests.
- Include some of the Town Forests in the American Tree Farm system. This would provide the public with an example of a managed forest.
- Survey and mark boundaries.
- Develop trail maps and make them available.
- Survey residents about their current and desired use of Town Forests.
- Establish a Town Forest Fund, update the Town Forest Ordinance and signage informing residents of how the Town Forests should and should not be used.
- Add adjacent parcels to the Town Forests when possible. Larger forest blocks are easier to manage and can be more productive.
- Consider placing conservation easements on Town Forests so that they are permanently protected.

11.0 Natural Communities

Gilmanton Natural Community – Walch Family Forest ~ Photo Courtesy Thomie Dombrowski

"The world of life, of spontaneity, the world of dawn and sunset and starlight, the world of soil and sunshine, of meadow and woodland, of hickory and oak and maple and hemlock and pineland forests, of wildlife dwelling around us, of the river and its wellbeing--all of this [is] the integral community in which we live." **~Thomas Berry**

The New Hampshire Natural Heritage Program defines a **natural community** as an assemblage of plants, animals and other organisms together with the natural physical environment in which they are found. Natural communities include different types of upland forests, grasslands, and wetlands, and they repeat on the landscape wherever suitable conditions occur. Gilmanton's natural communities not only play a practical and essential role in keeping our soil, water and air healthy – they provide us with diverse physical landscapes and scenic beauty.

Natural communities are defined by three characteristics:

- What plant species are present;
- The physical structure of the vegetation (short grasses vs. tall trees);
- The physical environment, which consists of the physical setting (pond shore or hillside), the water and nutrients present and the climate.

Natural communities are made up of living components that are closely interrelated and interact with one another and the environment. Humans are also a part of the living landscape and have a tremendous influence. Human disturbance of the natural environment is occurring at a faster pace than the natural communities can adapt to. It is vital we become aware of the natural communities we have in Gilmanton in order to protect them.

Nutrient-poor basin swamps; sandy pond shores; mineral-enriched swamps (including seepage swamps); and rich and semi-rich mesic forests are only a few of the natural communities occurring in Gilmanton. Examples of natural communities that can be considered to be ecologically exemplary are increasingly harder to find in New Hampshire. The New Hampshire Natural Heritage Bureau in Concord has fact sheets that define, describe, list plant species present, and provide conservation considerations for the Natural Communities of New Hampshire. They may be contacted at www.nhdfl.org/formgt/nhiweb or (603) 271-3623 for more information.

Protecting our natural communities is necessary to preserve the biological diversity of our Town and of New Hampshire. Biological Diversity, or **biodiversity**, is the variety and variability of all living organisms. This variety includes the diversity of plants, animals, fungi, algae, bacteria, and other microorganisms, their genetic variability, the natural communities in which they live, and the processes and interactions that weave the biological and physical elements of the planet into a complex web. [1]

For more information online see: https://www.nh.gov/nhdfl/natural-heritage/natural-communities.htm. An excellent reference is *The Nature of New Hampshire: Natural communities of the Granite State,* Dan Sperduto and Ben Kimball, New Hampshire Natural Heritage Bureau, 2011, available from Amazon.

That publication defines "natural communities" as recurring assemblages of plants and animals found in particular physical environments. While also establishing the same three characteristics as the above Natural Heritage Program, the authors further describe New Hampshire as "a mosaic of natural communities, encompassing habitats as varied as alpine meadows, riverbanks, forests, tidal marshes, ponds, and cliffs. Communities range from common and widespread types that cover hundreds or thousands of acres across broad areas of the state, to uncommon or rare types that are small and restricted to a specific part of the state…Across much of the landscape, a few forest types form a matrix, with other natural community types occurring as patches embedded within that matrix. *Sperduto, Kimball*, at 1.

Gilmanton is located within the eastern temperate region, an area coincident with eastern deciduous forests. Most New Hampshire species with temperate distributions occupy particular sub-regions or portions of the eastern deciduous forest. Hemlock, yellow birch, white pine, sugar maple American beech, red maple, and black cherry occur throughout New Hampshire. Oaks, hickories, and dogwoods, representative Appalachian or central hardwood species, occur mainly in central and southern parts of the state. *Sperduto, Kimball,* at 1. Gilmanton includes most of the species listed above.

New Hampshire includes eight distinct biophysical natural community groupings, including alpine and subalpine, rocky ground, forests, peatlands, swamps, marshes, river channels and floodplain forests and seacoast. These are spread among eight ecological regions, namely the White Mountains, Connecticut River Valley, Monadnock-Sunapee Highlands, Southwest New Hampshire Lowlands, the Lakes Region (which includes Gilmanton), Merrimack River Valley, and the Coastal Plain. These are more particularly described at *Sperduto, Kimball*, at pp. 28-33.

[1] *New Hampshire's Living Legacy, the Biodiversity of the Granite State*, NH Fish and Game Department, 1996.

Among others, there are two very interesting natural communities identified in and near Gilmanton. One is a tupelo tree (also known as black gum)-red maple swamp located within the Ella Stroud Memorial Forest, which is on Shellcamp Road across from Page and Dow Road and next to the Buzzell Cemetery. The area is easily accessible along the trail through the Forest. The other interesting natural communities are located in the Belknap Range and are red pine-rocky ridge communities (Nanci Mitchell communication).

The Nature of New Hampshire, Natural Communities of the Granite State, Dan Sperduto and Ben Kimball, New Hampshire Natural Heritage Bureau, University of New Hampshire Press, University Press of New England, Hanover and London.

12.0 Plant Communities

Greater Fringed Gentian ~https://awesomenativeplants.info/photo

"In some native languages the term for plants translates to 'those who take care of us.'

~ Robin Wall Kimmerer, Scientist, decorated professor and enrolled member of the Citizen Potawatomi Nation. She is author of *Braiding Sweetgrass; Indigenous Wisdom, Scientific Wisdom, Scientific Knowledge and the Teaching of Plants.*

The State of New Hampshire includes four different climate regions: arctic-alpine, boreal, temperate and coastal plain. Gilmanton is located within the eastern temperate region, an area coincident with eastern deciduous forests. Most New Hampshire species with temperate distributions occupy particular sub-regions or portions of the eastern deciduous forest. Hemlock, yellow birch, white pine, sugar maple American beech, red maple, and black cherry occur throughout New Hampshire. Oaks, hickories, and dogwoods, representative Appalachian or central hardwood species, occur mainly in central and southern parts of the state. Gilmanton includes most of the species listed above. For a more in depth discussion of the plant communities included in the other climate regions, see *Sperduto, Kimball* at pp. 27-28.

12.1 Rare and Imperiled Species

In 1987, the New Hampshire state legislature passed the Native Plant Protection Act (NH RSA 217-A) and formally recognized that "for human needs and enjoyment, the interests of science, and the economy of the state, native plants throughout this state should be protected and conserved; and their numbers should be maintained and enhanced to insure their perpetuation as viable components of their ecosystems for the benefit of the people of New Hampshire."

Currently, there are approximately 400 species listed as endangered or threatened under the Native Plant Protection Act and that are tracked by the NH Natural Heritage Bureau

(https://www.nh.gov/nhdfl/natural-heritage/rare-native-plants.htm). A complete listing of these species can be found on the NH Natural Heritage Bureau's website at the above website or by contacting them at Natural Heritage/DRED, PO Box 1856, Concord NH 03302-1856, (603) 272-3623. Please contact them if you are aware of the location of any of these species, in order that the state-wide database may be made more complete. The Bureau has a policy of never releasing exact locations.

The Gilmanton Conservation Commission encourages input from residents should they find an unusual plant species or a unique natural community. The Commission may be reached by calling the Gilmanton Selectmen's office at (603) 267-6700 or by mail at PO Box 550, Gilmanton NH 03237.

Endangered and threatened are defined under the NH Native Plant Protection Act as:

- **Endangered species** are those in danger of being extirpated from the state;
- **Threatened species** face the possibility of becoming "endangered".

The records of rare plant species in Gilmanton are very old and the current status and location of these species is unknown. The listings recorded at the New Hampshire Natural Heritage Inventory are shown in Table 14. A targeted botanical survey, with landowner permission, might determine whether these species or other rare species and plant communities are present.

Table 14. Historic Records of Rare Species in Gilmanton[1]

		Reports in last 20 years	
Species	**NH Listing**	**Town**	**State**
Allegheny-vine	endangered	historical	21
American water-awlwort	endangered	historical	7
Back's sedge	endangered	historical	17
bristle-leaved sedge	endangered	historical	2
button sedge	endangered	historical	7
Canada mountain-rice grass	endangered	historical	6
coast cinquefoil	endangered	historical	2
greater fringed-gentian	threatened	historical	30
leafy pondweed	endangered	historical	5
mossy-cup oak	endangered	historical	2
northern shore quillwort	endangered	historical	16
red goosefoot	endangered	historical	6
smooth black sedge	endangered	historical	11
common loon	threatened	5	339
Blanding's turtle	endangered	2	1,098
smooth green snake	special concern	1	85

[1]New Hampshire Natural Heritage Bureau, Department of Resources and Economic Development, Concord, NH.

wood turtle	special concern	3	281
American eel	special concern	1	177
bridle shiner	threatened	1	36

12.2 Invasive Species

***Celastrus orbiculatus,* Oriental or Chinese Bittersweet ~ Photo Courtesy of Paula Gilman**

What is an Invasive Species? An Invasive Species is a plant, insect, and/or fungal species that is not naturally native to a particular region and has the ability to thrive and spread aggressively outside its natural range. The Invasive Species thrives and spreads in a new habitat due to the fact it has no natural predators (insects, diseases and/or foraging animals) that naturally keep its growth under control as they would in their own native habitat.

Why include "Invasive Species" in a Natural Resources Inventory? It is important that those of us who reside in Gilmanton be informed and aware of invasive species (plants, insects and fungal species) that have the potential to destroy and displace those natural resources that are vital to our biodiversity.

According to a study in the May 3, 2019 journal Rhodora, nearly 1/5th of New England's 3,000 plant species have been lost from our region over the last 150 years. In an article published in March 2021 researchers Christophe Diagne, Boris Leroy, Anne-Charlotte Vaissiere, Rondolphe E Gonzlan, et.al. Calculated the "High and rising economic costs of biological invasions worldwide.

Their research found that the total reported costs of invasions reached a minimum of US $1.288 trillion (2017 US dollars) over the past few decades (1970-2017) with an annual mean cost of $26 billion which was further expected to increase to US $162.7 billion by 2017. Costs are likely understated. In addition, invasive species are destroying public natural areas at an estimated rate of 4,600 acres per day. The Nature Conservancy estimates that 42% of all species on the Federal Endangered Species Lists are listed partly due to the effects of invasive

species (and for 18%, invasive species are the sole reason for their listing).[2] Rich, diverse plant communities can become barren, inhospitable expanses of invasive plants with little value to wildlife. Invasive plants may even deplete groundwater. The public must be educated to buy plants wisely and to control existing invasive plants. Additional information is available at UNH Cooperative Extension offices.

Conserving Plant Diversity, (by Authors Mark Anderson, Director of Conservation Science, The Nature Conservancy; Michael Piantedosi, Director of Conservation, Native Plant Trust; William Brumback, Director of Conservation Emeritus, Native Plant Trust); in New England is a study published in June 2021 by the Native Plant Trust and The Nature Conservancy. The report provides a scientific framework and detailed roadmap for conservation action and land protection at the species, habitat, and parcel scales that have the potential to save plant diversity - and thus overall biodiversity - in New England as the climate changes.

According to the report - "For many conservation activities, plants are considered background, yet they furnish and cleanse the air we breathe and provide the basis for our medicines and food (Grifo and Rosenthal 1997). They are the basis for all life on planet Earth, and their role in forming and maintaining the eco- systems of the world has been valued at $125 trillion per year in tangible ecological services that benefit humans (Costanza et al. 2014). Plants also remove carbon dioxide from the atmosphere and store it as wood, leaves, roots, and soil. Plants process 123 billion metric tons of carbon each year across the globe (Beer et al. 2010), thus stemming the buildup of greenhouse gases. Half the weight of a tree consists of stored carbon, and since 80% of New England is forested, forests can help reduce the impact of climate change (Catanzaro and D'Amato 2019).

Conserving multiple intact examples of every habitat is a strategy for sustaining the natural benefits plants provide and for maintaining the full diversity of species that depend on them."

The report recommends that for each significant habitat, we should consider the conservation actions listed on next page. We should begin by identifying the habitats in Gilmanton.

- Protect as Much Intact, Diverse, Complex Habitat as Possible;
- Monitor Plant Populations for Health and Threats;
- Collect and Bank Seeds to Preserve the Genetic Diversity of Species and Habitats;
- Manage Habitats for Plant Diversity Where Necessary and Feasible;
- Augment and Introduce;
- Conduct Assisted Migrations.

12.3 Why and Where are Invasive Species a problem?

Without any natural predators to prevent its spread, the invasive species, particularly in the case of plants, will put extreme pressure on native plants and animals. Ultimately the invasive plant will alter native habitats and reduce biodiversity by choking out native vegetation, threatening rare and endangered species and degrading wildlife habitat. With the loss of native vegetation and wildlife habitat also comes the loss of a number of our native animal, bird and insect species that depend on the native habitats to survive. Invasive species present the worst threat in wetlands, sand dunes, fire prone areas, and serpentine barrens where rare native plants are found.[3]

[2]Conservation Notes of the NE Wildflower Society

[3]United States National Arboretum

Invasive plants:

- Produce large numbers of new plants each season;
- Tolerate many soil types and weather conditions;
- Spread easily and efficiently, usually by wind, water, or animals;
- Grow rapidly, allowing them to displace slower growing plants;
- Spread rampantly when they are free of the natural checks and balances found in their native range. [4]

In 2000, the State of New Hampshire enacted legislation under House Bill 1258-FN which "requires the Commissioner of Agriculture, Markets, and Food to conduct research and educational activities which address the effects of invasive plant, insect and fungal species upon the state".[5] As a result of this legislation, the New Hampshire Invasive Species Committee was formed. The Committee consists of nine members with representatives from the Department of Agriculture, Markets, and Food, Department of Environmental Services, Department of Natural and Cultural Resources, Department of Transportation, NH Fish and Game, the University of New Hampshire, The Nature Conservancy, the horticultural community, and the general public.

House Bill 1258-FN further "requires the commissioner to publish annually lists of invasive species that present potential or immediate danger to the environmental and economic interests of the state".[6] The annual lists are broken down into three categories.

12.4 N.H. Invasive Species - Prohibited List

Invasive species deemed to present an immediate danger to the health of native species, to the environment, to commercial agricultural or forest crop production or to human health. These species are immediately prohibited from sale, transport, distribution, propagation or transplantation in New Hampshire. Note that this list does not include species already prohibited since 1998 under RSA 487:16-a of the NH Department of Environmental Services. The list is available through the Department of Agriculture, Markets, and Food. Please note that species not presently abundant in New Hampshire, but deemed to present a threat in the future, are listed in the Invasive Plant Species Watch List, Available through the New Hampshire Invasive Species Committee. [7]

For identification of any of New Hampshire's invasive species, please consult the *New Hampshire Guide to Upland Invasive Species*, last updated in 2018 by the Plant Industry Division of the Department of Agriculture, Markets, and Food.

Among the invasive plant species that present the most danger to our native plants and animals are purple loosestrife, Oriental bittersweet, bush honeysuckle, autumn olive, Japanese barberry, burning bush, and multiflora rose. A single, mature purple loosestrife is capable of producing as many as 2.7 million seeds in one growing season. The Oriental bittersweet will twine itself up 60 – 70 foot trees and strangle them to death. Giant hogweed is very toxic to humans, causing blistering and scarring upon contact.

[4]United States National Arboretum

[5, 6]Final Version HB 1258-FN

[7]UNH Cooperative Extension News & Views for New Hampshire's Green Industry, July – September, 2004

13.0 Insects

Monarch Butterfly on native Solidago "Fireworks" ~ Photo Courtesy of Paula Gilman

"If we were to wipe out insects alone on the planet, the rest of life and humanity with it would mostly disappear from the land. Within a few months."

~E.O. Wilson, Biologist & Researcher

13.1 Beneficial Insects

Why include beneficial insects in the Natural Resources Inventory? Beneficial insects are a natural way to fight insect pests and protect our environment. When we encourage beneficial

insects, we are increasing our biodiversity and decreasing our dependence on poisonous chemical controls. Not only are we creating a more beautiful environment, but a safer one as well.

There are two categories of insects considered beneficials ---- predators and parasites. Predators are organisms that kill and feed on their prey outright. They are generally larger

than their prey and must eat lots of prey to complete their development. Parasites are usually smaller and often weaker than their prey. They lay eggs on or within a host insect. The immature larvae use the host for food over time. A parasite will use only one or a few insects for food.

You can entice beneficials to your yard and garden by providing them with the three basic necessities: water, food and shelter. In addition, you should avoid using and/or spraying broad-spectrum insecticides. The broad-spectrum insecticides are not selective in that they will kill not only the pest but the beneficial as well. Even the organic pesticides will kill the beneficials.

Table 15 is a list of the more important beneficial insects we should encourage. Please consult the *Beneficial Insects in New Hampshire Farms and Gardens* fact sheet authored by Dr. Alan Eaton for the UNH Cooperative Extension.

Table 15. Beneficial Insects of New Hampshire			
Parasites	**Predators**	**Active Searchers**	**Pollinators**
Big-headed fly	Ant lion	Dragonfly	Bumblebee
Braconid wasp	Cecidomyid fly	Firefly	Butterfly
Chalcid wasp	Chamaemyiid fly	Mantis fly	Honey bee
Ichneumond wasp	Lacewing	Paper wasp	Moth
Pelecenid wasp	Ladybug	Preying Mantis	
Tachinid fly	Syrphid fly	Soldier beetle	

13.2 Prohibited Insects

Insect species that pose a threat to the state:
https://www.agriculture.nh.gov/publications-forms/documents/upland-invasive-species.pdf.
https://entomologytoday.org/2018/06/21/invasive-insects-the-top-4-most-wanted-list/

14.0 Wildlife

Various wildlife habitat looking towards the Belknaps ~ Photo Courtesy of Thomie Dombrowski

Gilmanton's forests, rocky ridges, farmland, and abundance of water provide rich and diverse habitat for numerous animal species. An inventory of animals for Gilmanton has never been conducted, so the extent of special habitats, rare species and common species is unknown. However, some information is available. These special habitats and unfragmented natural lands need to be conserved in order to prevent common species from becoming rare and rare species from being extirpated from New Hampshire.

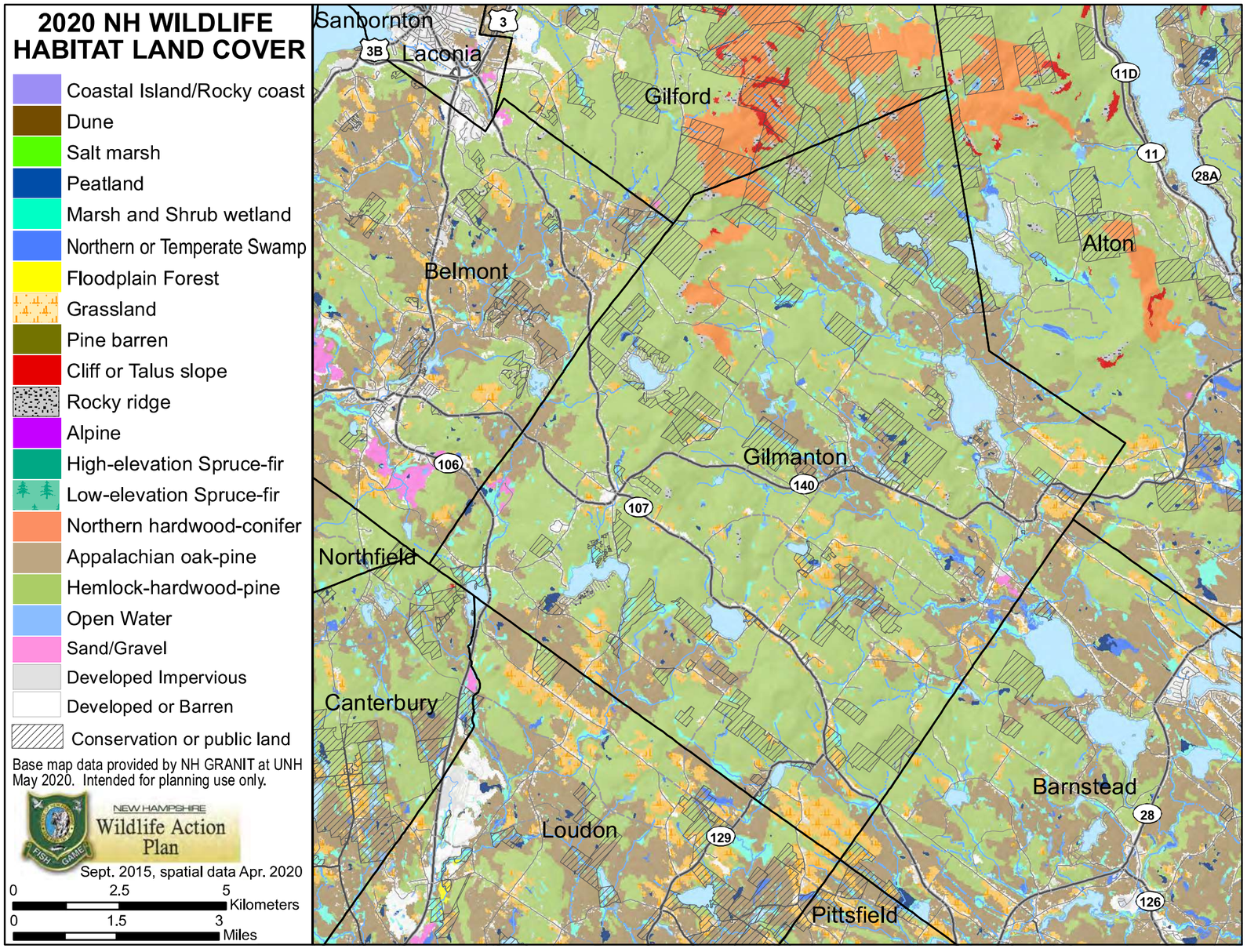
The New Hampshire Wildlife Action Plan (WAP) discusses various issues affecting wildlife in New Hampshire, including Gilmanton. It can be found at Wildlife Action Plan | Wildlife | New Hampshire Fish and Game Department (state.nh.us). The plan includes discussion of the following topics:

- Species of Greatest Conservation Need and habitat profiles (Chapter 2 and Appendices A & B);
- Current distribution and abundance of wildlife species & habitats (Chapters 2 & 3);
- Threats to species and habitats (Chapter 4, Appendices A & B);
- Conservation actions needed to recover & protect SGCN and habitats (Chapter 5);
- Monitoring of wildlife populations & habitats, and success of conservation actions (Chapters 5, 6, 7);
- Partner & public participation in Plan development and implementation (Chapters 1 and 7, Appendices J, K, L, M, N).

An excellent executive summary of the issues and recommendations of the NH WAP can be found at executive-summary.pdf (state.nh.us).

Educate the public as to what a significant habitat is.

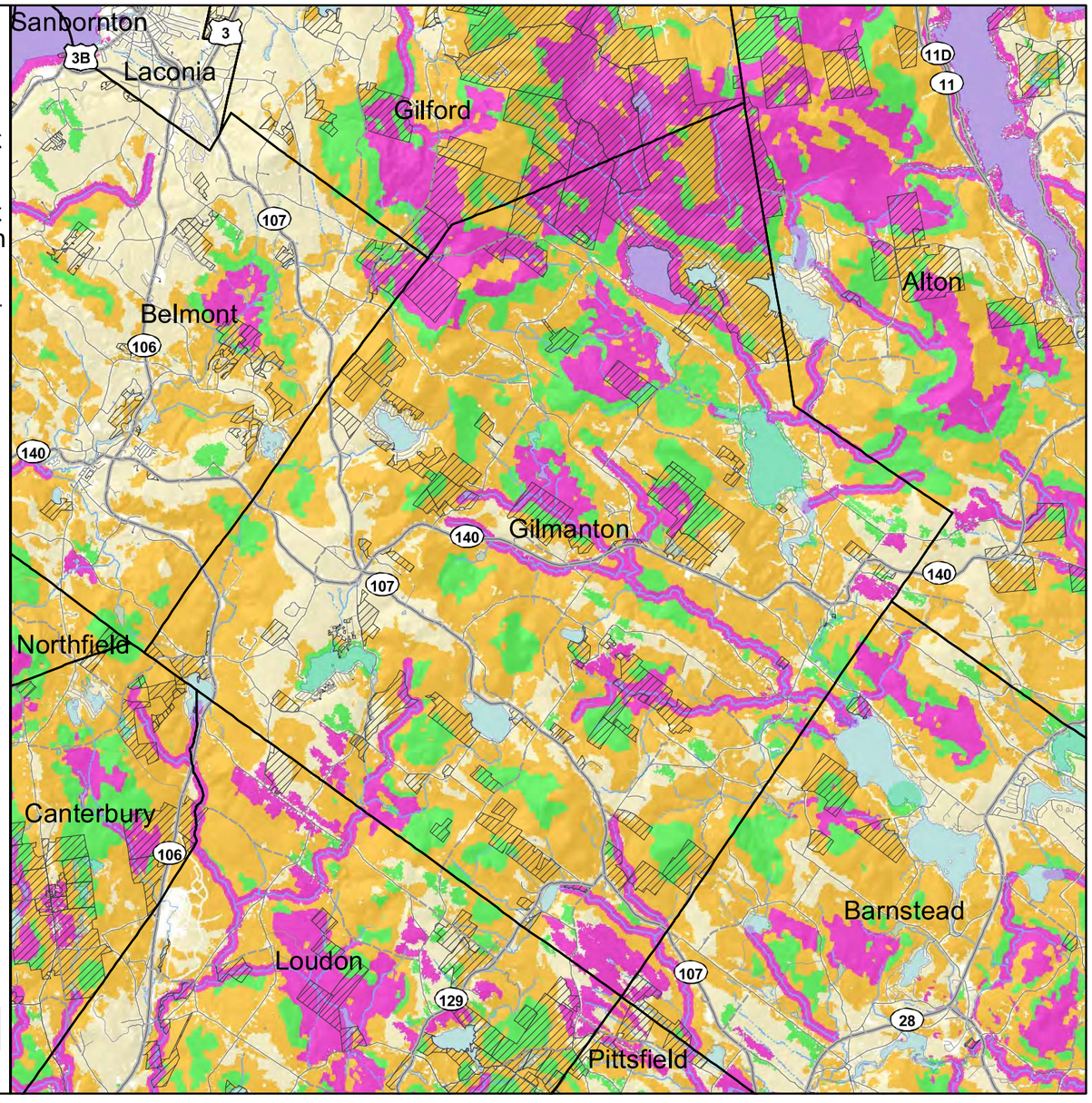
Table 16. Wildlife Action Plan Habitat in Gilmanton	
Habitat Type	**Acres**
Appalachian oak-pine forest	6,007.3
Cliff and talus slopes	7.3
Developed-impervious	1,310.5
Developed or barren	865.1
Grassland	1,843.7
Hemlock-hardwood-pine forest	23,518.1
Northern hardwood-conifer forest	754.1
Northern swamp	31.6
Open water	1,591
Peatland	143.4
Rocky ridge	223.9
Sand-gravel	61.8
Temperate swamp	193.9
Marsh and shrub wetland	1,575.6
Total	38,127.3


2020 NH WILDLIFE HABITAT LAND COVER
Coastal Island/Rocky coast
Dune
Salt marsh
Peatland
Marsh and Shrub wetland
Northern or Temperate Swamp
Floodplain Forest
Grassland
Pine barren
Cliff or Talus slope
Rocky ridge
Alpine
High-elevation Spruce-fir
Low-elevation Spruce-fir
Northern hardwood-conifer
Appalachian oak-pine
Hemlock-hardwood-pine
Open Water
Sand/Gravel
Developed Impervious
Developed or Barren
Conservation or public land
Base map data provided by NH GRANIT at UNH
May 2020. Intended for planning use only.
NEW HAMPSHIRE
Wildlife Action Plan
Sept. 2015, spatial data Apr. 2020
0 2.5 5
Kilometers
0 1.5 3
Miles
Sanbornton
Laconia
Gilford
Belmont
Alton
Gilmanton
Northfield
Canterbury
Loudon
Barnstead
Pittsfield
3
3B
11D
11
28A
106
140
107
129
28
126

2020 HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in New Hampshire
- Highest Ranked Habitat in the Biological Region

  Biological region = TNC ecoregional subsection for terrestrial habitats or Aquatic Resource Mitigation region for wetlands and floodplain forest.
- Supporting Landscapes
- Conservation or public



Base map data provided by NH GRANIT at UNH May 2020. Intended for planning use only.

NEW HAMPSHIRE Wildlife Action Plan

Sept. 2015, spatial data Apr. 2020

0 2.5 5 Kilometers

0 1.5 3 Miles

15.0 Unfragmented Lands

Large blocks of forest, wetlands and farmland that are unfragmented by development or public roads are valuable for many reasons:

- Provide essential forest interior habitat for species such as some songbirds that need to be distanced from human activity, pets, and the forest edge in order to survive;
- Provide habitat for mammals that have large home ranges and prefer to avoid human contact such as bobcat, otter, and moose;
- Enable owners of large parcels of forestland to conduct timber harvests that are economically viable;
- Minimize conflicts that can arise when managed forests and farms are surrounded and interspersed with development;
- Offer opportunities for remote recreation, including hunting, hiking and snowmobiling, where landowners allow.

Larger fragments are more likely to support viable populations of species and therefore act as a source of individuals that can then move to another fragment. Small fragments may be unable to support breeding populations. Persistent fragmentation may also lead to genetic changes and a loss of genetic diversity as populations are subdivided into small locally breeding populations.

Many large blocks of forestland are still intact in Gilmanton. About 70% of Gilmanton's forests are part of a contiguous area of forestland of at least 500 acres in size.[1] Table 17 lists the 14 largest areas of contiguous open space in town and some of their major attributes. A threshold of 500 acres was used, which has some basis in conservation biology for the survival of many wildlife species.[2] The location of the blocks is also shown on the Unfragmented Lands Map. The map was made by constructing a 500 ft. buffer around all roads and a 250 ft. buffer around all buildings. Water bodies and streams are also shown on the map. A one mile buffer around the Town was included in the map. Table 17 has a column with the acreage that is in Gilmanton only, and another column that includes the acreage in the adjacent towns that is a part of the one mile buffer.

Table 17. Unfragmented Blocks in Gilmanton (over 500 acres)

Town Rank	Fragment	Acres in Town	Acres w/1 mile buffer	Features
1	Belknap Mountain	4,079	9,350	Durrell Mountain, Grant Hill, Manning Lake
2	Cogswell Mountain / Nelson Brook	3,432	3,432	Crystal Lake headwaters, town forest
3	Sawyer Lake / Middle Route	3,095	3,211	Nighthawk Hollow Brook and wetlands
4	Jones Mill / Pancake Hill	2,287	3,011	Academy Brook, Pancake Hill

[1]See Table 18

[2] Kanter, John, et al, 2001 and Patterns of Development Task Force

5	Ayers Brook	1,684	1,684	Gilman Road (Class VI), wetlands
6	Parsonage Hill / Meetinghouse Pond	1,757	1,757	Varney Brook, Peaked Hill, prime farmland
7	Pancake and Frisky Hills	1,645	1,645	Ladd's Ledge
8	Loon Pond	1,313	1,313	Academy Brook and wetlands
9	Pine Hill	1,198	2,159	Prime farmland, Kelley wetlands
10	Nighthawk Hollow Brook	1,174	1,174	Aquifers, wetlands, Suncook Lakes headwaters
11	Kimball Brook	676	1,108	Aquifer, wetlands
12	Sanborn Hill	593	1,564	Rollins Pond, Kelley Brook, prime farmland
13	Badger Brook	549	861	Sargent Lake watershed
14	Hall's Hill	542	2,208	Scenic views, prime farmland

*acreages include land and water and some farmland

Town of Gilmanton Unfragmented Lands

April, 2022

Data Sources

Most data displayed here (roads, water bodies, contours) represent stock shapefiles from NH GRANIT as maintained by the University of New Hampshire,updated against records from the Town of Gilmanton Special thanks to Nanci Mitchell for her cartographic help.

Conservation land includes stock datasets from NH GRANIT as well as more recent lands added from parcel maps from the same source.

This map was produced by Soren Denlinger for the Gilmanton Conservation Commission and the Gilmanton Land Trust. It is intended for planning purposes only. Property lines as interpreted here should not be construed as binding or conclusive evidence of ownership. Not all conservation lands shown are open to public use.

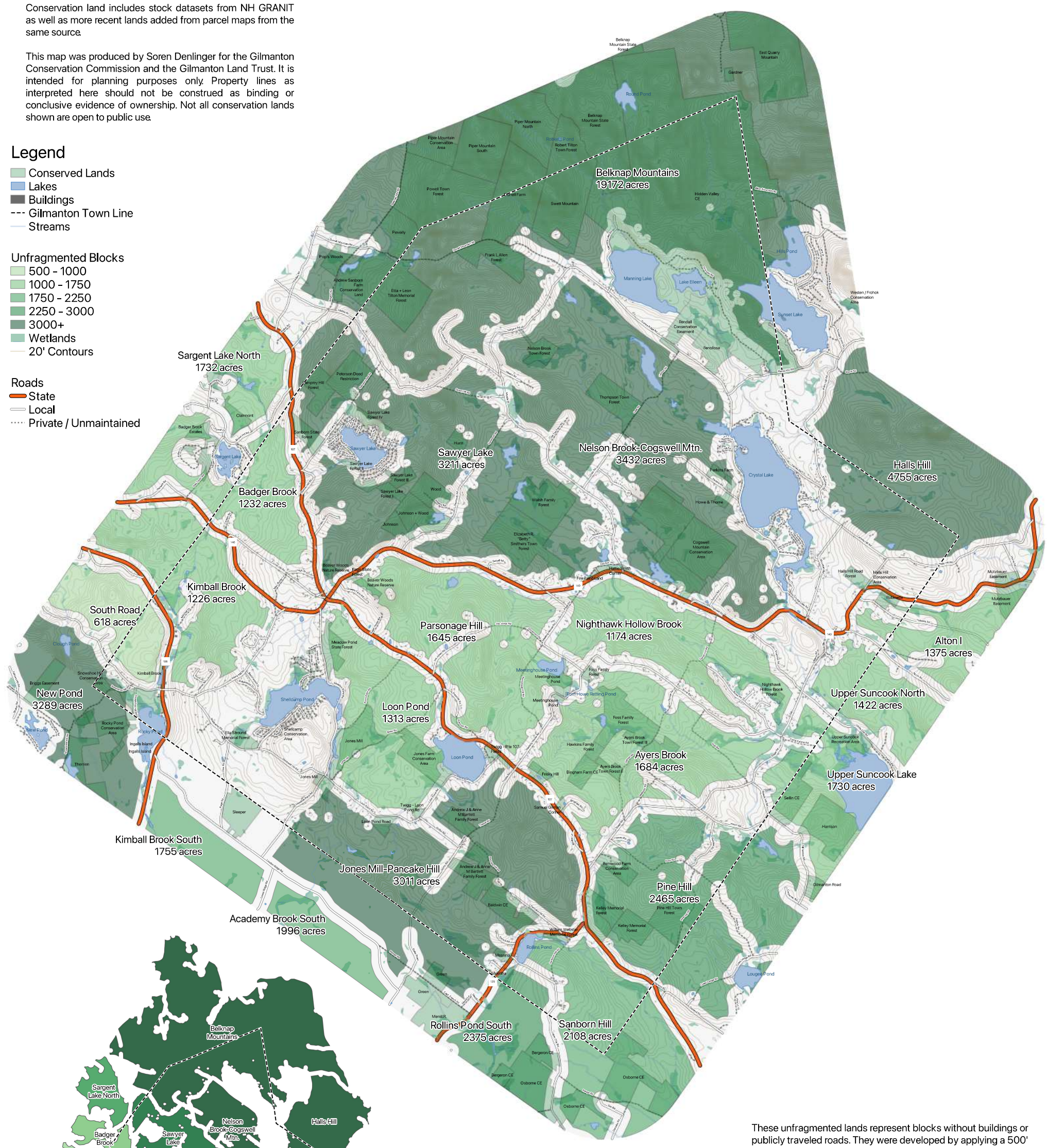
Legend

- Conserved Lands
- Lakes
- Buildings
- Gilmanton Town Line
- Streams

Unfragmented Blocks
- 500 - 1000
- 1000 - 1750
- 1750 - 2250
- 2250 - 3000
- 3000+
- Wetlands
- 20' Contours

Roads
- State
- Local
- Private / Unmaintained

0 1 2 3 mi



These unfragmented lands represent blocks without buildings or publicly traveled roads. They were developed by applying a 500' buffer to roads (classes I-V) and a 250' buffer to buildings. The resulting blocks and their acreages may include agricultural land, wetlands,and open water in addition to forest.

When houses or roads divide blocks of land, the remaining habitat may be unable to support native wildlife. As this pattern continues,the number of species and their populations decline. Some animals, like bear and bobcat, rely only large blocks of unfragmented land.

Identifying unfragmented blocks of land helps communities plan to protect their open space, wildlife habitat, drinking water, and recreation areas.

Conserving these large blocks and connections between other significant habitat areas is important if residents want to retain the species that need larger and diverse home ranges and territories. It is important to note that the acreages above are for unfragmented blocks in the town and for blocks including the one mile buffer. Some areas should be studied further because the extent of unfragmented lands extends significantly into an adjacent Town making that block more important. For example, the entire unfragmented block labeled Belknap Mountain is 19,172 acres if town boundaries are not considered and the block labeled Hall's Hill increases from 542 acres in Gilmanton to 4,755 acres.

Habitat block size requirements for various animals is currently a subject of much study. The following data is from the 2015 Wildlife Action Plan.

Table 18. Unfragmented Block Requirements by Species	
Minimum Acres	**Species**
25	Breeding pair of whip-poor-wills
100	Red-shouldered hawk
100	Wood Thrush
500	Wood spotted, or Blanding's turtle (maximum dispersal area)
1,200	Northern goshawk
1,320	Cooper's hawk (maximum home range)
3,900-6,200	Lynx
9,400	Breeding pair of northern goshawks
23,600	Bobcat (average home range for male)

15.1 Species of Concern

There are no official records of endangered or threatened species in Gilmanton and no inventory of animals for Gilmanton has ever been conducted. It should be noted that many species will be added to a list of species of concern if their habitat continues to be diminished. An extensive and detailed wildlife inventory should be completed for Gilmanton by a professional natural resources consultant. The following bird species that are tracked by the NHNHB have been reported to the Commission: Bald Eagle, Brown Thrasher, Common Loon (nesting on Manning, Sunset, Crystal Lake, Loon Pond, and Shellcamp Pond), Eastern Screech Owl, Great Blue Heron (at least two rookeries), Osprey, Red-shouldered Hawk and Whip-poor-will.

Despite the lack of a formal inventory of animal species in Gilmanton, many interesting lists exist. People observing additional species should report their sighting to the Gilmanton Conservation Commission, the New Hampshire Fish and Game Department or the Audubon Society of New Hampshire. Some of the species reported to the Commission are listed in the tables below.

Table 19. Bird Species Observed in Gilmanton		
American Black Duck	Dark-Eyed Junco	Olive-Sided Flycatcher
American Goldfinch	Downy Woodpecker	Osprey
American Kestrel	Eastern Kingbird	Pileated Woodpecker

American Redstart	Eastern Phoebe	Pine Grosbeak
American Tree Sparrow	Eastern Wood-Pewee	Pine Siskin
American Woodcock	Evening Grosbeak	Purple Finch
Bald Eagle	Flycatcher	Red-Breasted Nuthatch
Baltimore Oriole	Fox Sparrow	Red-Bellied Woodpecker
Barn Swallow	Gold-Crowned Kinglet	Red-Headed Woodpecker
Barred Owl	Grasshopper Sparrow	Red-Shouldered Hawk
Belted Kingfisher	Gray Catbird	Red-Tailed Hawk
Black-and-White Warbler	Great Blue Heron	Red-Winged Blackbird
Black-Capped Chickadee	Great Horned Owl	Robin
Black-Throated Blue Warbler	Great-Crested Flycatcher	Rose-Breasted Grosbeak
Black-Throated Green Warbler	Hairy Woodpecker	Ruby-Throated Hummingbird
Blue Grosbeak	Hermit Thrush	Ruffed Grouse
Blue Jay	Hooded Merganser	Rufous-Sided Towhee
Bobolink	House Finch	Scarlet Tanager
Broad-Winged Hawk	House Sparrow	Screech Owl
Brown Creeper	House Wren	Sharp-Shinned Hawk
Brown Thrasher	Indigo Bunting	Song Sparrow
Canada Goose	Killdeer	Tree Swallow
Canada Warbler	Least Flycatcher	Tufted Titmouse
Cardinal	Loon	Turkey
Cedar Waxwing	Magnolia Warbler	Turkey Vulture
Chestnut-Sided Warbler	Mallard Duck	Veery
Chipping Sparrow	Mourning Dove	Vireo
Common Flicker	Nashville Warbler	Whip-Poor-Will
Common Grackle	Northern Flicker	White-Breasted Nuthatch
Common Nighthawk	Northern Harrier	White-Throated Sparrow
Common Redpoll	Northern Mockingbird	Winter Wren
Common Yellowthroat Warbler	Northern Raven	Wood Thrush
Cooper's Hawk	Northern Shrike	Yellow Bellied Sapsucker
Cowbird	Tree Sparrow	Yellow-Rumped Warbler
Crow	Ovenbird	
Eastern Bluebird	Pheasant	

Table 20. Mammal Species Observed in Gilmanton		
Bat	Gray Squirrel	Red Squirrel
Beaver	Long-Tailed Jumping Mouse	River Otter
Black Bear	Mink	Short-Tail Weasel
Bobcat	Mole	Shrew
Chipmunk	Moose	Skunk
Coyote	Mountain Lion	Snowshoe Hare

Eastern Cottontail Rabbit	Opossum	Vole
Fisher	Porcupine	White-Footed Mouse
Flying Squirrel	Raccoon	White-Tailed Deer
Gray Fox	Red Fox	Woodchuck

There are several anecdotal reports of mountain lions in Gilmanton since at least 2008. There has been no formal recognition of these reports by NH Fish and Game to date.

Table 21. Reptile Species Observed in Gilmanton	
Bullfrog	Northern Brown Snake
Common Snapping Turtle	Northern Redback Salamander
Eastern American Toad	Northern Redbelly Snake
Eastern Garter Snake	Northern Spring Peeper
Eastern Milk Snake	Red-spotted Newt (Red Eft is juvenile phase)
Eastern Painted Turtle	Spotted Salamander
Eastern Smooth Green Snake	Wood Frog
Gray Tree Frog	Wood Turtle

15.2 Significant Habitats

All wildlife needs food, shelter, water and space to survive. These life requirements are defined as an animal's habitat. Animals use a variety of strategies to find food, water and shelter in the environment and it is these strategies that determine the habitat needs for each species. Habitat is everywhere, yet some habitat is more important to wildlife than others. Habitat is more significant when it[3]:

- Supports a rare species;
- Represents a smaller percentage of the landscape;
- Provides an abundance of food or other resources;
- Provides a buffer for wildlife against the effects of development;
- Supports several types of habitats.

Based on the 2015 and 2020 Wildlife Action Plan (WAP), the following habitat types are considered to be significant in New Hampshire:

A. ***Habitat of Rare Wildlife Species*** – examples include bald eagle wintering areas, peregrine nesting cliffs, loon nesting areas and Great Blue Heron rookeries. In Gilmanton, loons have been known to nest on Crystal Lake, Manning Lake, Shellcamp Pond, Sunset Lake, and for the first time in over 50 years on Loon Pond (summer 2021). Herons have nested on a beaver pond on Middle Route, on the beaver pond across from the school and in a wetland along the outlet stream from Lake Eileen. A pair of Bald Eagles have taken up residence on Loon and Shellcamp Ponds this year – 2021 – and have been seen in several locations in Lower Gilmanton, especially over Pine Hill.

[3]Identifying and Protecting New Hampshire's Significant Wildlife Habitat: A Guide for Towns and Conservation Groups, NH Fish and Game Department, 2001.

B. ***Unfragmented Lands*** – Large tracts of contiguous habitat that include a mix of forests, wetlands, riparian areas or other habitat which support wide-ranging mammals and forest interior birds. Gilmanton is fortunate to have several large unfragmented blocks of land.

C. ***Riparian Areas and Large Wetlands*** – Riparian areas along water courses, especially those areas that connect river corridors, wetlands and unfragmented lands. Large wetlands or wetland complexes that support a variety of wetland dependent wildlife. The Nighthawk Hollow Brook and Nelson Brook areas are examples of this habitat in Gilmanton.

D. ***Agricultural and Other Open Land*** – Large fields and shrub lands that support species dependent on this open land type. This habitat has been disappearing in Gilmanton as farmland is converted to development or reverts back to forest.

E. ***Other Unique or Critical Habitats*** - This habitat type is divided into the following groups:

   a. Habitat that is rare statewide, for example pine barrens;
   b. Habitat that is rare in a particular geographic area, for example mountains in southern New Hampshire;
   c. Uncommon land features which provide unique conditions for certain species, for example denning sites in rock piles;
   d. Habitat critical to certain species during a particular phase of their life cycle or a particular time of the year. Examples include vernal pools, waterfowl migration stop-over sites and deer wintering areas, all of which are found in Gilmanton. Crystal Lake and associated wetlands are valuable stop-over sites for migrating waterfowl in the spring and fall. Canada and Brant geese, mergansers, pied-billed grebes, mallards, and many other species rest and feed here. Migrating geese also feed in the stubble of Gilmanton cornfields in the late fall. Seeps or seepage wetlands are generally small areas (less than ¼ acre) that occur where groundwater comes to the surface. These sites are the first to green-up in the spring and are frequented by a variety of wildlife for that reason. Dependent species include bear, deer, moose, turkey, salamanders, migrating birds and woodcock.[4]

The New Hampshire Fish and Game Department recently (2020) updated the statewide mapping of significant wildlife habitat using the protocol outlined in "Identifying and Protecting New Hampshire's Significant Wildlife Habitat: A Guide for Towns and Conservation Groups". These maps can be viewed at the Town Hall and should be used to focus attention on areas that should possibly be protected and that should, at a minimum, be studied carefully before any destruction of the habitat occurs.[5] The Habitat Features Map shows riparian corridors, wetlands larger than 5 acres, clusters of wetlands less than 5 acres, agricultural and other non-forested lands, uncommon habitat types and south facing slopes. A co-occurrence map shows what happens when all of the habitat features are overlaid on each other. The darker the color, the more habitat features that overlap and the greater the significance to wildlife. Information that was not included in this mapping project includes

[4]Good Forestry in the Granite State, NH Division of Forests and Lands and SPNHF, 1997.

[5]NH Fish and Game Department, 3/31/04, Coarse Filter Analysis of Potentially Significant Wildlife Habitats·

bird migration stopover habitat, deer wintering areas, mast production areas and vernal pools. The New Hampshire Fish and Game Department has begun the process of refining these coarse filter analysis maps.

15.3 Fisheries

Fishing is a popular activity and Gilmanton's fisheries are an important natural resource. It is important to keep in mind that many of our fish have been contaminated by mercury and other pollutants. Before eating any fish, consult with the most recent Fish and Game advisories as to what is a safe consumption level.

The following information was supplied by Jim Juneau, former Conservation Officer. All trout species noted below are annually stocked. Stocking reports for the previous year are available on Fish and Game's website at www.wildlife.state.nh.us. In addition, detailed maps are included in a publication by DeLorme Publishing Company, Freeport ME 04032. This publication included maps for Crystal and Manning Lakes and shows a maximum depth of 51 feet in Crystal Lake and 56 feet in Manning Lake.

Table 22. Fisheries in Gilmanton

Body of Water	Species
Crystal Lake	Rainbow trout, warm water species
Kid's Pond (Academy Building)	Eastern brook trout
Lake Eileen	Warm water species
Manning Lake	Eastern brook trout, smelt, warm water species
Meeting House Pond	Warm water species
Rocky Pond	Warm water species
Rollins Pond	Warm water species
Sawyer Lake	Warm water species
Shellcamp Pond	Warm water species
Sunset Lake	Smelt, warm water species
Ayers Brook	Eastern brook trout
Guinea Brook (Moulton Brook)	Eastern brook trout
Nelson Brook	Eastern brook trout
Nighthawk Hollow Brook	Eastern brook trout
Suncook River	Eastern brook trout, warm water species
Warm water species may include smallmouth bass, largemouth bass, yellow perch, pickerel, sunfish, hornpout, and others.	

15.4 Wildlife Recommendations – https://www.takingactionforwildlife.org/

Gilmanton's wildlife, and the habitat that it requires, is an important component of the rural character of the town that is so important to its residents. Because the habitat maps highlight large, unfragmented blocks of land and wetlands, conserving key wildlife habitats will also work towards preserving rural character and water quality.

- Protect significant habitats.

- Decrease pollutants so that all wildlife, including humans have a safe food supply, clean air to breathe and clean water to drink.
- Protect riparian corridors with wetland buffers in a Wetland Ordinance.
- Keep unfragmented parcels unfragmented.
- Minimize impacts to significant habitat during development by requiring that a wildlife study be conducted.
- Conduct scientific studies of potentially significant habitats possibly with interns from college-level programs.
- Educate the public as to what a significant habitat is.

16.0 RECREATIONAL TRAILS

View of Crystal Lake from top of restored Cogswell Mountain Trail ~ Photo Courtesy of Rich Maher

"…two roads diverged in the wood and I took the one less traveled by, and that has made all the difference." **~Robert Frost, *The Road Not Taken***

A much utilized, but often overlooked part of the natural resources of Gilmanton is the extensive trail system that exists in town. Hikers, horseback riders, hunters, snowmobilers and ATVs all benefit from the trail system that has been developed. This system consists of many discontinued and non town-maintained roads (see list), logging roads and age-old trails. The Gilmanton Snowmobile Association should be thanked for their efforts in both trail maintenance and landowner permission. Through this permission and cooperation of the many residents and nonresident land owners, the trail system exists for the benefit of all to use and enjoy responsibly.

There are challenges to this system. Changes in ownership of land over which the trails pass have led to the closing of some of the trail system to many of its users. Gates have been erected and land posted in a direct challenge to Gilmanton's and New Hampshire's tradition of keeping land open to the public.

The trail system that exists today as a hidden gem yet often overlooked component of the quality of life of the townspeople can easily be lost in just a few short years. The trails can't be replanted like a forest, or cleaned up like a polluted river. Once they are gone, they will never again exist. Their loss would greatly impact the many users that today count their existence as one of the good things about living in Gilmanton. The next generation of residents of Gilmanton may never know the benefits of this natural resource unless we act today to protect it for them. We have indeed come to a fork in the road as our decisions will affect not only ourselves, but those that will follow in our footsteps.

Table 23. Class VI Roads	
Canaan Road	Page Road
Doe Road	Parsonage Hill Road
Donovan Road	Perkins Road
Durrell Mountain Road	Potter Road
Gale Road	Prescott Road
Governors Road	Sawtooth Road
Joe Jones Road	Seibel Road
Mary Butler Lane	Shannon Road
Nelson Road	Valley Shores Road
Old Town Road	Weeks Road

16.1 Trail Recommendations

Gilmanton residents enjoy being outside whether it be for snowmobiling, hiking, skiing or bird watching. Currently, there is an extensive trail system made up of hiking trails, snowmobile trails, Class VI roads, discontinued roads and other paths on private property. It is important that this trail system be preserved for future generations. Recommendations that might make this possible include:

- Develop Class VI roads only after a master plan for their use has been completed and an alternative trail system suitable for all trail uses has been developed;
- Develop a community trail system suitable for multi-use. All types of users should be involved in the planning process;
- Maintain trail connectivity during the subdivision process;
- Develop trail guides and maps;
- Improve pedestrian trail systems on town-owned land;
- Develop a system for maintaining and constructing pedestrian trails;
- Balance potentially competitive trail uses.

17.0 Scenic Resources

Frisky Hill view encompasses ridgelines, forested hillsides, open fields and water
~ Photo Courtesy of Paula Gilman

The diverse topography and land types in Gilmanton make it a very scenic place. Views of mountains, forests, fields, lakes, streams and wetlands, particularly in juxtaposition, are enjoyed by residents and visitors alike. Many favorite scenic landscapes are viewed from public roads. These have been identified over the years in public meetings and surveys, such as Frisky Hill. Views of ridgelines and forested hillsides across open fields or water seem to be most highly valued.

In addition, Gilmanton participated in a Lakes Region Planning Commission project in 1998 to identify important local natural and cultural features. These "Local Resource Protection Priorities" were mapped and are in the process of being updated.

The following is an attempt to compile all of this information, but the list should not be considered inclusive and it has not been prioritized. Only scenic resources that can be observed from a public road or are easily accessible are included.

Landscape Views

- Belknap Range as viewed from many places; Durrell Mountain, Swett Mountain and Mount Mack are in Gilmanton
- Fields off of NH Rte. 107
- Fields on Stage Road
- Fields on Stone Road
- Frisky Hill and view of Belknaps and the undeveloped foothills to their south
- Grant Hill
- Guinea Ridge
- Halls Hill
- Pancake Hill/Ladd's Ledge
- Peaked Hill

- Pine Hill
- Stockwell Hill
- Sunset Hill (top of Copp Road)
- View both north and south from height of land on Guinea Ridge
- Tom Howe Barn & Conservation Area with fields on Meeting House Road and views of Meeting House Pond

Scenic Roadways

- Currier Hill Road
- Durrell Mountain Road
- Gale Road
- Guinea Ridge Road
- Meadow Pond Road
- Meeting House Road
- Sawtooth Road
- Stone Road

Scenic Farms

- Black Horse Farm
- Bosiak Farm
- Dawson Farm
- Fowl Language Farm
- Geddes Farm
- Gilmanton Winery
- Kardinal Farm
- Kelley Farm
- Lakeview Farm
- Moore Farm
- Pleasant Valley Farm
- Potter Farm
- Price Farm and Sugar House
- Sanborn Farm
- Warburton Farm

Scenic Water Bodies

- Academy Brook
- Crystal Lake
- Kettle Hole Ponds by Crystal Lake
- Lake Eileen
- Loon Pond
- Manning Lake
- Meeting House Pond
- Nelson Brook and Wetlands
- Rollins Pond
- Shellcamp Pond
- Suncook River
- Sunset Lake

Scenic Wetlands

- Bean Road Wetlands
- Cogswell Mountain Conservation Area Wetlands
- Hidden Valley Wetlands
- Hunkins Brook Beaver Pond at headwaters
- Jones Farm Conservation Area Wetlands
- Kelley Meadows
- Kimball Brook Wetlands
- Nelson Brook at Nat's Bridge
- Nighthawk Hollow Brook and Associated Wetlands
- Shellcamp Pond Wetlands
- Suncook Flats Wetlands
- Suncook River Wetlands at NH Rte. 140
- Townline Wetlands near NH Rte. 129
- Wetlands/Beaver Pond on Middle Route (two locations)
- Wetlands/Beaver Pond on north side of NH Rte. 140 across from the school

Scenic Rivers and Streams

- Ayers Brook and Associated Wetlands
- Kimball Brook and Associated Wetlands
- Nelson Brook and Associated Wetlands
- Nighthawk Hollow and Associated Wetlands
- Suncook River

Scenic views under night sky

A scenic resource that is often overlooked is the ***night sky***. Low levels of light pollution allow a clear view of stars, planets and other celestial objects.

17.1 Scenic Resources Recommendations

Gilmanton should look beyond its Town boundaries when planning for the future. Much of the view and rural character is based upon an unobscured view of the Belknap Mountain Range. However, much of this range is outside the borders of the Town. The Town works with adjacent towns and the Belknap Range Conservation Coalition to protect this view and also preserve the vast passive recreational opportunities offered by this range.

In addition to the view, unfragmented blocks of land extend into the surrounding towns and it is important to protect the portion in Gilmanton and that in the abutting town. All of Gilmanton's aquifers cross town lines and all towns should assume responsibility for their protection.

18.0 Conserved Lands

Charter Members of Gilmanton Land Trust with Loon Pond in background.
~ Photo Courtesy of Sarah Thorne

Tom Howe's favorite quote:
I long for wildness… woods where the wood thrush forever sings, where the hours are early morning ones, and there is dew on the grass, and the day is forever unproven… a New Hampshire everlasting and unfallen. **~ Henry David Thoreau**

Gilmanton's conservation and recreation lands enhance the quality of life for its residents and visitors in many ways. Hiking and snowmobile-trail users enjoy the natural beauty of Gilmanton forests, fields, ridge tops and shorelines. Wildlife benefits from extensive areas of protected habitat. Water quality and quantity are safeguarded by conservation lands. Property values and the municipal budget also benefit from conservation land as open space has a negligible impact on the tax rate compared to residential development. [1]

For many decades, residents have donated their lands or conservation easements on that land, to the Town, the State, or non-profit conservation organizations for the benefit of future generations. The Gilmanton Conservation Commission, Gilmanton Land Trust, Society for the Protection of New Hampshire Forests, Audubon Society of New Hampshire, Five Rivers Conservation Trust, Lakes Region Conservation Trust, Belknap Range Conservation Coalition, and the State of New Hampshire have all been active partners with Gilmanton landowners in voluntarily conserving these lands. When necessary, these groups have worked together to raise monies to purchase land or conservation easements on especially sensitive parcels.

Conserved lands are listed in Table 24. Some of these lands are owned publicly and guarantee public access. Some are protected with conservation easements and are owned by private individuals and families who retain control over whether to allow public recreational access to their lands. It should be noted that some of the Town owned lands are not permanently conserved, as the voters of the Town could vote to change to the use of these

[1]Auger, Phil, Does Open Space Pay?, University of New Hampshire Cooperative Extension, Durham, NH 1994

lands. Some of these lands, especially the Town Forests, should be protected in perpetuity with conservation easements.

The approximate total area of conservation lands in Gilmanton is 6,989 acres or 18% of the town. The Conservation Lands Map shows the location of these lands. For comparison, local towns have conserved the following percentages of their lands: Gilford, 24.3%; Canterbury 18.5%; Loudon, 10.23%; Alton, 10.09%; Barnstead, 5.3%.

The columns in Table 24 have the following meanings:

Protection Method –

- FO (Fee Ownership) means that the conservation parcel is owned by the Town, another governmental entity or a conservation organization.
- CE/DR means that the land is protected through a conservation easement or deed restrictions that are held by the Town, another governmental entity or a conservation organization.

Protection Agency – This is the conservation organization or government agency that either owns or holds the conservation easement.

Acres – This is the approximate size. Discrepancies are frequent since some parcels have not been surveyed. The Town tax maps were used as the data source. These figures will differ from those found on the Conservation Lands map due to the digitizing process.

Public Access – Whether or not public access is guaranteed.

Table 24. Conservation Lands and Town Forests

Name	Protection Method	Protection Agency	Acres	Public Access
Ayers Brook Town Forests	FO	Town	81	yes
Bacon Water Resources Lot	CE, FO	Bacon, Town	2.6	No
Baldwin Conservation Area	CE	Town	107 & 110	No
Bartlett Family Forest	CE	Town	39 & 116.2	yes
Beaver Woods Nature Preserve	CE	Town, CE w/5RCT	13.71 & 19.97	yes
Belknap Mountain State Forest	FO	State	123	yes
Bingham Farm Conservation Area	CE	Town	26.07 & 11.94	yes, trails
Bolton Family Forest	CE	Town	2.3	yes
Charles G. Kelley Memorial Forest	CE	SPNHF	181	yes
Cogswell Mtn. Conservation Area	CE	Town	309	yes
Durrell Farm (Mitchell)	CE	SPNHF	206	yes
Elizabeth R. Betty Smithers Town Forest	FO	Town	211	yes
Ella Stroud Memorial Forest	FO	Town	34.9	yes

Etta and Leon Tilton Memorial Forest	FO	SPNHF	211	yes
Fernwood Farm Conservation Area	CE	Town	52.7 & 49.14	no
Fish Pond	FO	Town	0.5	yes
Foss Family Forest	FO	SPNHF	196	yes
Frank L. Allen Forest	FO	SPNHF	125	yes
Friskie Hill View Shed	FO	Town, CE with 5RCT	10.0 & 5.03	yes
Halls Hill Swamp	DR	Town	28	no
Hattie Smith Corner	DR	Town	14	no
Hawkins Family Forest	CE	SPNHF	18	yes
Hidden Valley	CE	State	2,251	yes
Howe-Thorne, I	CE	5RCT	14.7	pedestrian access
Howe-Thorne, II	CE	5RCT	10.7	no
Hurst	CE	Town	27	no
Johnson + Wood	CE	ASNH	190	yes
Jones Farm Conservation Area	CE	ASNH	124	yes
Kimball Brook	DR	Town	9.9	no
Lamprey Hill	CE	Town	73	no
Loon Pond Road Lot	DR	Town	17	no
Meadow Pond State Forest	FO	State	69	yes
McDonough Lot	FO	Town	.16	yes
Meeting House Pond Conservation Area - Heritage Lane	FO	Town	3.56	yes
Tom Howe Barn and Conservation Area - Meeting House Road	FO	Town	35.46 & 5.57	yes
Meadow Pond State Forest	FO	State	68.8	yes
Messina	CE	Town	28	no
Nelson Brook Town Forest	FO	Town	47	yes
Nighthawk Hollow Brook Forest	FO	Town	4	yes
Page State Forest	FO	State	4	yes
Perkins Farm	CE	5RCT	14.519	yes
Peterson Deed Restriction	DR	Peterson, Ward & Corey	100.1 & 101	no
Pine Hill Town Forest	FO	Town	141	yes
Rendall Conservation Area	CE	5RCT	114.4	no
Robinette Conservation Area	CE	5RCT	24.74	yes
Rocky Pond Restoration Area	CE	State	66	yes

Route 107 Upper Field Tract	CE	5RCT	6.77	yes
Route 107 Lower Field Tract	CE	5RCT	14.04	yes
Samuel Gilman Corner	FO	Town	7.49	yes
Sanborn State Forest	FO	State	51	yes
Sawyer Lake Forests	DR	Village District	51	no
William Webster Memorial Forest	FO	Town	9.3	no
Shellcamp Conservation Area	FO	Town	3	yes
Snowshoe Hill Conservation Area	FO	Town	17.68	yes
Suncook River Land	FO	Town	1.7	yes
Swett Mountain Conservation Area/Mitchell	CE	SPNHF	344	no
Thompson Town Forest	FO	Town	123	yes
Valley Shores Conservation Area	FO	Town	24	yes
Water Resources Lot	FO	Town	2.5 & 2.7	no
Walch Family Town Forest	FO	Town	189.036	yes
Walch Family Forest	FO	Town	104.453	yes
Wilson/Sapiro Conservation Area	CE	5RCT	164	no
Zarta Conservation Area	CE	Town	13.262 & 11.249	no

The largest conserved property in Gilmanton, Hidden Valley, is owned by the Daniel Webster Council of the Boy Scouts of America aka the Griswold Scout Reservation, in the northern part of town. It is conserved by a conservation easement held by the State of New Hampshire.

Of note on the Conserved Lands map is that there are many small lots that are not able to be labeled on the map due to software limitations.

Town of Gilmanton Conservation Lands

Revised December, 2022

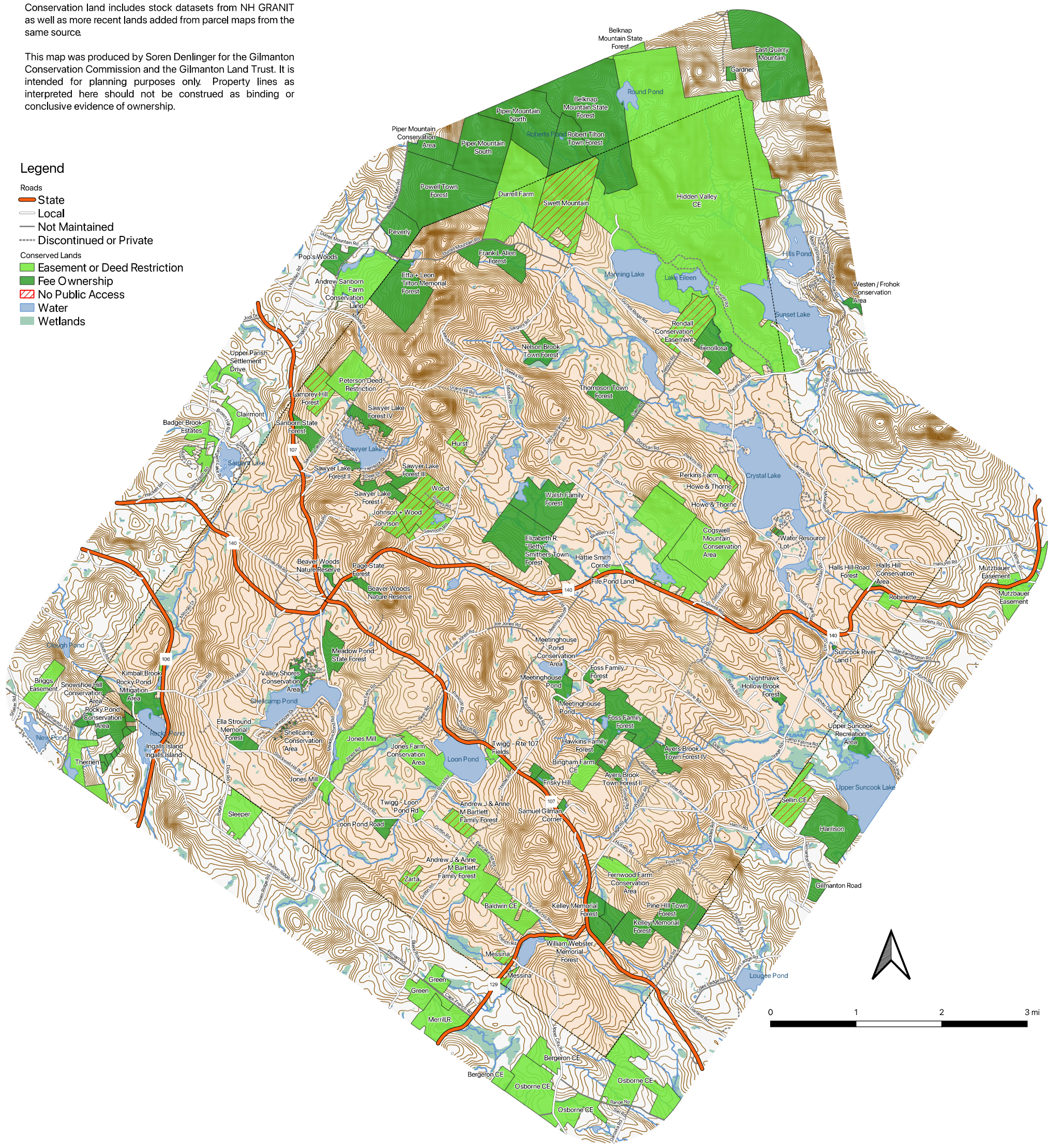
Data Sources

Most data displayed here (roads, water bodies, contours) represent stock shapefiles from NH GRANIT as maintained by the University of New Hampshire, updated against records from the Town of Gilmanton Special thanks to Nanci Mitchell for her cartographic help.

Conservation land includes stock datasets from NH GRANIT as well as more recent lands added from parcel maps from the same source.

This map was produced by Soren Denlinger for the Gilmanton Conservation Commission and the Gilmanton Land Trust. It is intended for planning purposes only. Property lines as interpreted here should not be construed as binding or conclusive evidence of ownership.

This map is in memory of Tom Howe, whose dedication to land conservation made many of these conserved lands possible.



18.1 New Hampshire's Return on investment in Land Conservation - 2014

The Executive Summary of the Trust for Public Land conducted an economic analysis of the return on New Hampshire's investment in land conservation through a variety of state programs that funded land acquisition statewide, and found that every $1.00 invested in land conservation returned $11.00 in natural goods and services to the New Hampshire economy. In addition, land conservation funded by the State of New Hampshire supports key industries that depend on the availability of high-quality protected land and water. New Hampshire has also been successful in leveraging funding support from federal, local and private sources, expanding the impact of the state's investment. A summary of the key findings and the benefits of open space investments by New Hampshire can be found at: https://www.tpl.org/sites/default/files/nh-state-roi-report.pdf

18.2 Current Use

Current Use is a method of taxation established by NH RSA 79-A which states in its purpose: "It is hereby declared to be in the public interest to encourage the preservation of open space, thus providing a healthful and attractive outdoor environment for work and recreation of the state's citizens, maintaining the character of the state's landscape, and conserving the land, water, forest, agricultural and wildlife resources. It is further declared to be in the public interest to prevent the loss of open space due to property taxation at values incompatible with open space usage. Open space land imposes few if any costs on local government and is therefore an economic benefit to its citizens. The means for encouraging preservation of open space authorized by this chapter is the assessment of land value for property taxation on the basis of current use. It is the intent of this chapter to encourage but not to require management practices on open space lands under current use assessment."

Thus, Current Use is designed to help landowners keep their open space undeveloped by assessing the land at its present use rather than its highest potential use. It is important to understand that Current Use is not a method for permanent protection of open space land. Land placed in Current Use can be removed from that program should the landowner decide to change the use of the land, but there is a penalty called the Land Use Change Tax. Detailed information about Current Use is in the *Current Use Criteria Booklet* available from the Department of Revenue Administration online at www.revenue.nh.gov. Approximately 66.4% of land in Gilmanton is enrolled in the Current Use program. Table 25 below details how many acres are in each Current Use category in Gilmanton.

Table 25. Current Use in Gilmanton

Category	Acres
Farmland	2,438.74
Forest Land (unmanaged)	
Hardwood	6,642.99
Pine	3,195.09
Other	8,260.07
Forest Land with Documented Stewardship	
Hardwood	1,309.29
Pine	308.89

Other	610.76
Unproductive Land	170.09
Wetland	933.03
Total Acres in Current Use	**23,868.95**

18.3 Land Protection Recommendations

Currently, approximately 18.2% of Gilmanton's lands are protected from development and half of this is the Griswold Scout Reservation. For comparison, neighboring towns have the following percentages of protected lands: Gilford, 24.3%; Canterbury, 18.5%; Loudon, 10.23%; Alton, 10.09%; Belmont, 6.2% and Barnstead, 5.3%. In order to keep Gilmanton a special place, the Town must endeavor to protect more of its lands from development but still allow for growth. This will be a challenge. Following are some steps to help the Town meet this challenge.

- More information is needed to prioritize lands to be protected. Public input should be solicited regarding the locations listed under scenic resources. The Town should also support the efforts of the Gilmanton Land Trust to conserve high-priority lands.
- A funding source for land protection should be established. Possibilities include a bond issue and an increase in the percentage of the Land Use Change Tax that is placed into the Conservation Fund.
- Consider permanent protection of Town owned conservation lands and Town Forests by placing conservation easements on them.
- Develop monitoring strategies for lands that are already protected by the Town.
- Encourage use of the Open Space Subdivision provisions in the Gilmanton Zoning Ordinance.
- Consider zoning that would limit development above certain elevations.

19.0 Climate Change

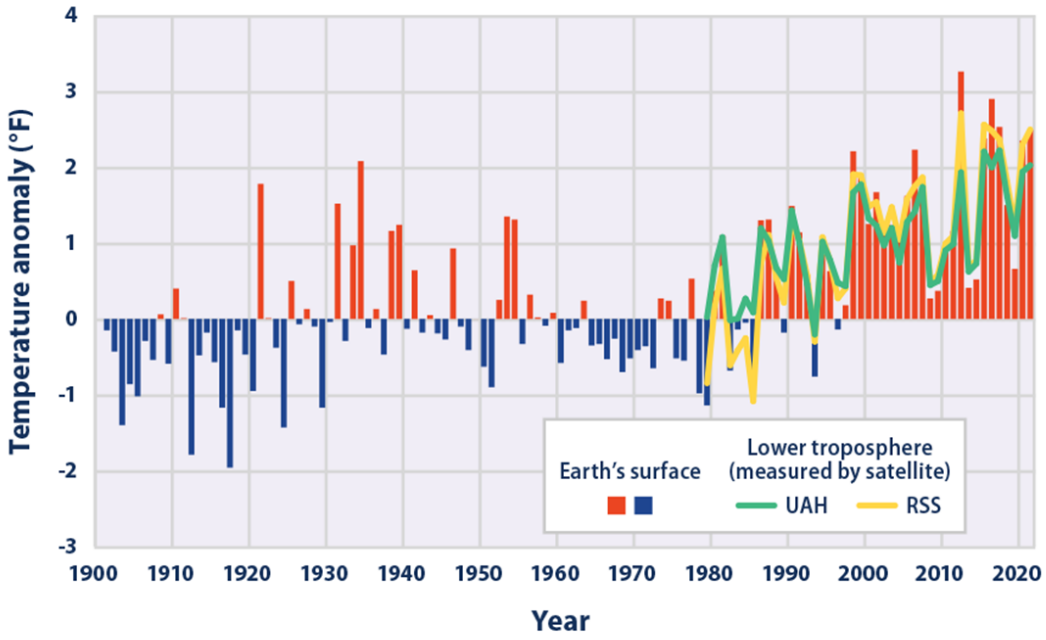
"The most alarming of all man's assaults upon the environment is the contamination of air, earth, rivers, and sea with dangerous and even lethal materials."

~Rachel Louise Carson, marine biologist, author, and conservationist whose influential book Silent Spring and other writings are credited with advancing the global environmental movement.

The graph on the next page describes trends in average surface temperature for the United States and the world.

https://www.epa.gov/climate-indicators/climate-change-indicators-us-and-global-temperature.

Graph 1. Temperatures in the Contiguous 48 States, 1901–2021



Climate change poses an existential threat to Gilmanton's natural resources and rural character. Heat waves, drought, intense storms, and irregular snow will all become commonplace. While the crisis will unavoidably harm the town, swift action can blunt its impact for the benefit of all.

19.1 Background

Pollution, in the form of greenhouse gasses, alters our atmosphere so that it retains more heat from the sun. Burning fossil fuels like coal, oil, and natural gas releases these gasses in the form of carbon dioxide, methane, and many others. Since the 1800s, New Hampshire's average temperature has warmed by over three degrees Fahrenheit, and will continue to heat up until greenhouse gas emissions are eliminated. Though a hotter planet is the most direct result, plenty of other global effects will follow, including melting ice caps, rising sea levels, disturbance of air and sea currents, and disruption of all elements of life that rely on those cycles.

19.2 Effects on Gilmanton

The climate crisis's most obvious impact is heat. Hot summers featuring long stretches of 90-degree days will grow commonplace. This poses a danger to those vulnerable to heat stroke or exhaustion, especially in houses without air conditioning. Warm winters, without consistent snow cover for skiing, snowmobiling, or ice fishing, will become the norm. This will drastically harm the Gilmanton Snowmobile Association, and some years its trails will never open. In the summer, hotter temperatures could lead to toxic cyanobacteria blooms in Shellcamp and Crystal Lake, especially given the shallow water of the former.

Shifting weather dynamics will increase the amount of precipitation Gilmanton receives each year. Less and less of this will be snow, and more will be rain. Additionally, rain will fall in fewer events, resulting in more common and prolonged drought. Some wells will run dry, requiring costly drilling. When rain does fall, it will come in more intense storms, causing increased flooding and runoff into streams and lakes.

Less snow and more drought will profoundly harm agriculture in Gilmanton. The town's farms rely on melting snowpack to recharge groundwater each spring. With less snow to melt, soils will be more prone to drought. Inconsistent rainfall will increase the severity of these droughts. Additionally, sugar maples will suffer greatly under a warming climate, resulting in harm to the town's production of maple syrup. By one estimate, up to 80% of sugar maples will decline.

As an indirect consequence of climate change, more people will move to Gilmanton. People escaping failing farms, rising seas, wildfires, and more intense heat farther south will view the Northeast as a safer destination. These migrations could threaten Gilmanton's rural character if the town becomes primarily residential.

Climate change will not solely affect humans. Slowly, over time, shifting temperature and precipitation patterns will rearrange ecosystems generally northward. Species near the northern end of their range here will become more common, like hickory and cedar. Conversely, Gilmanton stands to lose some species that prefer cooler temperatures, like balsam fir, spruce, or sugar maple. Animals will follow as their home ecosystems shift. Unfortunately, this change will create space for destructive invasive species, like the hemlock wooly adelgid. Other unwanted changes will also occur, like the prevalence of ticks and Lyme disease.

The Native Plant Trust and the Nature Conservancy have collaboratively mapped the Northeast's climate resilience as a function of physical character, microclimate, and connectedness (Conserving Plant Diversity in New England by Anderson, Piantedosi, and Brumback). Within Gilmanton, several sites were ranked as more resilient than average: Nighthawk Hollow Brook, Nelson Brook, and Ayers Brook. Additionally, two general areas were ranked far more resilient than average: the Belknap Range and Bradford Hill. Ensuring that these areas remain forested will disproportionately benefit Gilmanton's biodiversity in the face of climate change. The report states, "Conserving multiple intact examples of every habitat is a strategy for sustaining the natural benefits plants provide and for maintaining the full diversity of species that depend on them."

19.3 Action

Change at the national and global level is sorely needed to mitigate the worst of the climate crisis. This includes the laws and policies of the federal government, as well as the actions of large corporations. Around 100 companies are responsible for the lion's share of carbon pollution, and only meaningful change at that level will successfully blunt the planet's crisis. Unfortunately, in a representative democracy like the United States, effecting this change as individuals is extremely difficult. Voting for candidates who favor action, placing pressure on elected officials, and demanding action through public events are the main avenues for change.

There are several ways to reduce one's personal carbon footprint. Reducing air travel, red meat intake, and consumption of consumer goods compose three of the most impactful personal decisions an individual can make to help the atmosphere.

Farmers add fertilizers to their soils to provide crops with the nutrients they need to grow. For thousands of years, humans have used mineral and organic fertilizers, like manure and ground bone, to improve soil fertility. In the last century, human-made fertilizers have greatly boosted crop production, letting farmers grow more food on less land.

But this uptick in fertilizer use has come at a cost: planet-warming greenhouse gas emissions. Worldwide, agriculture is the second-largest source of climate change pollution[1] - and both the manufacturing and application of fertilizer has a heavy emissions toll. In the early 1900s, scientists invented a process to mass-produce a nitrogen-containing compound, ammonia, that plants can absorb from the soil. Today, ammonia is the second-most commonly produced chemical in the world, used in huge quantities as a very effective fertilizer.

This invention revolutionized farming, doubling the number of people that one acre of land could feed.[2] But ammonia has to be made at a high pressure under high temperatures, meaning it takes a lot of energy to manufacture. Most of that energy comes from burning fossil fuels like coal and methane gas, which give off the greenhouse gas carbon dioxide, the main cause of climate change. Ammonia manufacturing today contributes between 1 and 2% of worldwide carbon dioxide emissions.[3]

Solar panels offer renewable energy for both one's house and the grid at large. Though expensive up front, solar panels generally pay for themselves in energy savings over 5-10 years. In addition to reducing the use of polluting fossil fuels, solar panels decentralize the energy grid and reduce the burden on each individual power plant. This, in turn, reduces outages and improves transmission.

Continued conservation in Gilmanton can soften the pain of the climate crisis. Setting land aside from development can help preserve the town's rural character and protect its most scenic features. Additionally, this land will be able to absorb carbon from the atmosphere to

https://climate.mit.edu/explainers/fertilizer-and-climate-change

[1]"Emissions by Sector." Our World in Data. Using data from the CAIT Climate Data Explorer via ClimateWatch

[2]Erisman, Jan Willem, et al. "How a Century of Ammonia Synthesis Changed the World." Nature Geoscience, vol. 1, no. 10, Oct. 2008, pp. 636–39, doi:10.1038/ngeo325

[3]Institute for Industrial Productivity, Industrial Efficiency Technology Database. Ammonia. Data as of 2011

directly combat emissions. These natural spaces can also serve as corridors through which animals may migrate to more suitable habitats as the town warms.

However, there are many more options for an individual on the local scale, in Gilmanton. Homeowners and landowners can plant native trees and practice responsible forestry. Importantly, conserving forests as forests retains their potential to sequester carbon and facilitate shifts in natural communities over time. Placing one's land in a conservation easement is an effective way to achieve these goals within a flexible framework.

The climate crisis is here. Only sweeping, meaningful action at all levels of society can mitigate its impacts on the town of Gilmanton. As carbon pollution continues, education and planning for the coming winter rain, summer drought, and intense storms should remain a top priority. The town's future remains unwritten, and our actions today will determine what sort of town awaits us in 5, 50, and 500 years.

A helpful article on how to each of us can reduce our carbon footprint can be found at: https://www.nytimes.com/guides/year-of-living-better/how-to-reduce-your-carbon-footprint

19.4 Climate Solutions: Putting New England's Woods To Work

Learn how we are beginning to put Exemplary Forestry to work across the region, while also championing the sustainable wood these standards produce as a replacement for other, more energy-intensive building materials.

https://newenglandforestry.org/2021/10/14/putting-woods-to-work/

In the Autumn 2022 volume *Forest Notes, New Hampshire's Conservation Magazine* published by the Society of the Protection of New Hampshire Forests, the Editor, Jack Savage states the following:

> ***"It would be easy to point to the nearly 60,000 acres of forestland owned and managed and the 135,000 acres of land already under easement that are already sequestering and storing carbon and declare: the Forest Society is addressing climate change. Keeping forests as forests, encouraging sustainable management practices that provide renewable wood resources while enhancing carbon sequestration and storage, increasing resilience, and fostering biodiversity are the wise use principles of our mission today."***
>
> ***"I believe that from challenges come opportunities. In the face of climate change, more people than ever recognize the value of New Hampshire's forests. More people than ever are embracing alternative energy sources and seeking to reduce emissions. Admittedly, like the Fraxinus americana (white ash), we do not yet have all the answers. Unlike the white ash, we humans have the ability - and the opportunity - to find those answers if we so choose".***

20.0 Priority Recommendations

After carefully considering Gilmanton's natural resources as well as related opportunities and threats, we have prioritized the recommendations enumerated earlier in this document into three action categories:

Educate, Protect and Conserve
Our near to intermediate term focus will be on these actions:

Educate:

- Create and conduct a regular series of educational events in Gilmanton focusing on the following topics:
- Water, wetland and aquifer resources;
- Agricultural resources and farm conservation easements;
- Forest resources. This includes familiarizing people engaged in forestry in Gilmanton with the publication "Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices in New Hampshire.";
- Natural communities;
- Invasive species;
- Household hazardous waste and non point water contamination; and
- Recreational resources.
- Promote awareness and understanding of wetlands laws and rules to protect the Town's lakes, ponds, rivers streams and ultimately watersheds;

Protect:

- Update the Town Forest Ordinance and place conservation easements on Town forests;
- Continue to review Zoning applications and proposed changes;
- Continue to monitor existing conservation easements; and
- Continue to maintain our trails.

Conserve:

- Focus both *proactive* and *reactive* Conservation Commission time and resources on town parcels which exhibit a high degree of the following:
- Prime agricultural soils;
- Wildlife habitat;
- Undeveloped areas of lake and pond frontage;
- Unfragmented blocks of forest land (particularly those adjacent to Town forests);
- Scenic and recreational resources; and
- Areas of climate resiliency as a function of physical character, microclimate and connectedness.
- Parcels susceptible to development that possess high conservation values

21.0 Summary and Conclusions

As the preceding pages have shown, Gilmanton is a special place. The wealth of its natural resources makes it a delight for the people who live here and a destination for those from all over who enjoy the outdoors and the recreational opportunities it provides. As a watershed for the Winnipesaukee, Soucook, Upper and Lower Suncook Rivers, Gilmanton's importance to New Hampshire far exceeds its borders. It is tempting to want to protect it in its entirety. Change and development, however, are not only inevitable but essential if a community is to maintain its vibrancy. The challenge is to provide for growth that is designed and intelligent rather than scattered and ill-considered. The areas where development can take place safely need to be identified and clearly defined. To that end we must keep the purity of our lakes, ponds, and waterways in mind. The open space and scenic vistas provided by our agricultural land and the excellent soil that land represents must be treated with respect. In addition, maintaining habitat for the biodiversity that exists in Gilmanton is essential. Humankind tends to look at its fellow creatures with an eye to the good they do for us.

How much wiser it seems to keep in mind the words of **Moses Maimonides in his *Guide for the Perplexed*:**

> ***"It should not be believed that all things exist for the sake of man. On the contrary, all the other beings too have been intended for their own sakes and not for the satisfaction of something else."***

It is the hope of the Gilmanton Conservation Commission that this Natural Resource Inventory will be a valuable resource as we plan for the future of our Town.