Town of Pelham, NH

Natural Resources Inventory

Prepared by the
Nashua Regional Planning Commission

NRPC

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TOWN OF PELHAM
NATURAL RESOURCES INVENTORY

I. PROJECT SUMMARY

This report is an update of the 2003 Natural Resource Inventory (NRI) for the Town of Pelham. The Pelham Conservation Commission contracted with Nashua Regional Planning Commission (NRPC) to prepare this update. The NRI provides Geographic Information System (GIS) data and maps current as of July 2021 and other relevant and timely information to help local officials and appointed boards assess the status of the town's natural resources. The NRI contains a narrative discussion, mapping, and recommendations related to conservation lands, drinking water resources and potential contaminant sources, wetlands and vernal pools, surface water resources, wildlife and plants, forest resources and lands of special importance.

Pelham recognizes that all-natural resources are important and that there are ongoing pressures on the town's natural resources due to land development and other human activities, invasive species, climate change and the impact of various contaminants. In 2003, NRPC mapped multiple overlapping or co-occurring natural resources of two or more types in an effort to help prioritize natural resources. The intent of this analysis was to depict multiple resources and their relationship to town-owned land, trails, surface waters and other open space to establish the significance of each area for conservation prioritization. The results of this analysis have been carried forward to the 2022 NRI and included in Section IX. The NRI can also be used to develop a comprehensive Conservation Plan, to aid in reviewing land use proposals, develop town programs and policies, and plan for future growth and development.

Merriam Cutter Conservation Area

II. CONSERVATION, PUBLIC LANDS AND OPEN SPACE

A. Existing Conservation Lands

Overall, total conservation land in Pelham encompasses 3,363 acres or 20% of the town's total area of 16,820.80 acres according to the State of New Hampshire GIS GRANIT data layer estimate. However, it should be noted that the GRANIT layer includes parcels that are Town-owned but do not have any specific level of protection from development other than Town ownership. Therefore, further research needs to be done to establish the level of protection on all of the parcels included in the inventory and to determine whether additional protection measures are warranted. Town Forest land is by far the largest category of conservation land in the town. Pelham's conservation lands are depicted on Map #1 on the following page.

B. Current Use

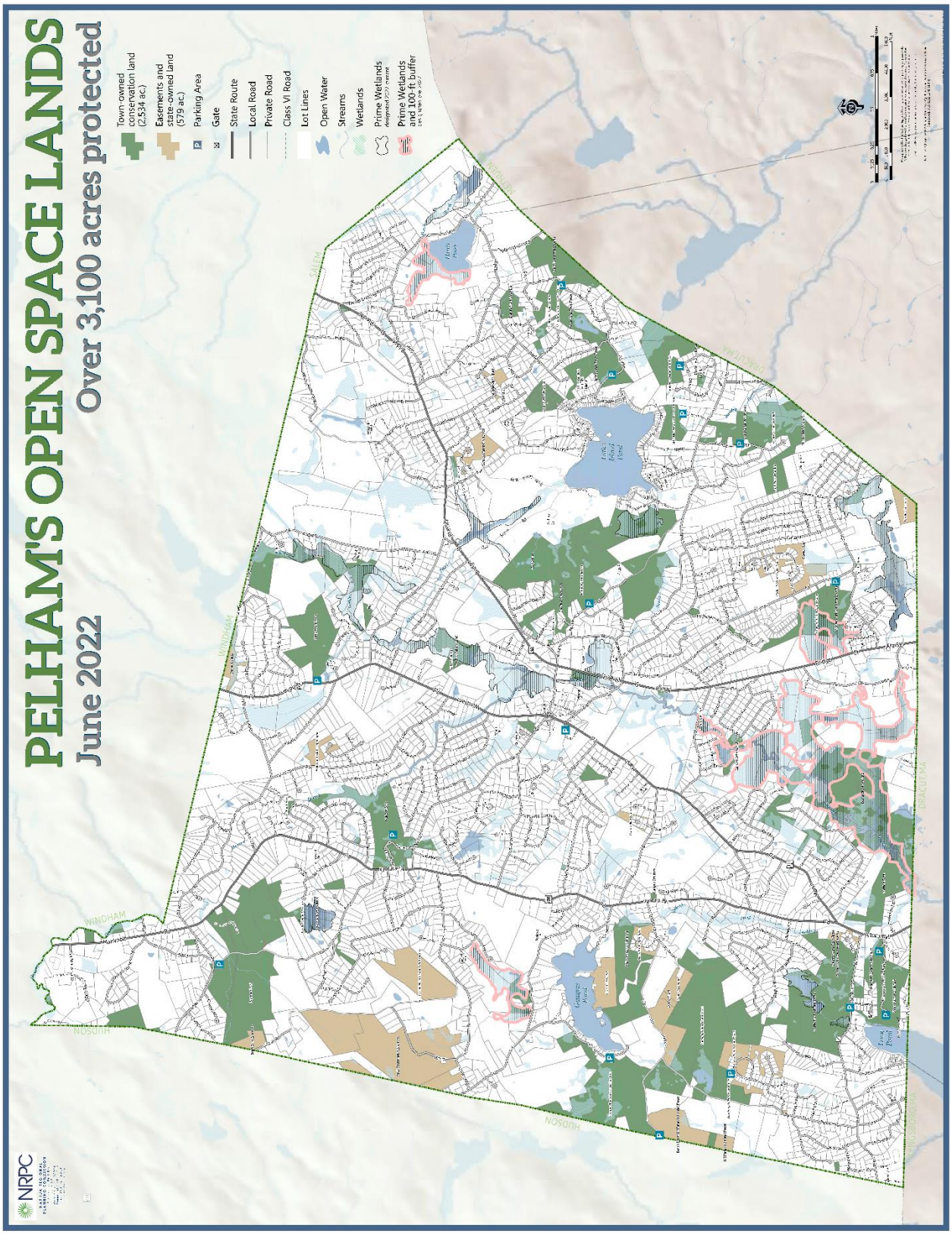
The Current Use program provides significantly reduced property tax assessments for forests, farmland, and wetlands of ten acres or greater and for active farms with a minimum $2,500 gross value of product on properties less than ten acres. Established under NHRSA 79-A, the program is intended to encourage the preservation of open space by assessing qualifying property based on its *current use* rather than at market value so that property owners are not compelled to sell land for development to cover property tax liabilities. The Current Use program, however, does not provide permanent protection since enrolled open land can easily be converted to other uses. Land in current use remains so until the land no longer meets the current use criteria. Typically, this occurs when the land is developed or subdivided into parcels smaller than the 10-acre minimum. Land coming out of current use is subject to a Land Use Change tax of 10% of the fair market value at the time of the change. Like many communities, Pelham has chosen to devote revenue from the land use change tax to conservation. In 2022, a warrant article was approved at Town Meeting to increase the percentage of land use change tax revenue dedicated to conservation from 75% to 100%. The table below shows the percentage of the Land Use Change Tax given to the Conservation Commission in the rest of the NRPC Region.

Table 1
Land Use Change Tax in the NRPC Region

Community	Percentage/Cap
Amherst	50% directly to Conservation Commission 50% Conservation Fund - needs town vote
Brookline	100% directly to Conservation Commission – public hearing only
Hollis	100% directly to Conservation Commission
Hudson	75% to Conservation Commission
Litchfield	10% directly to Conservation Commission
Lyndeborough	10% to Conservation Commission - no restrictions
Merrimack	100% directly to Conservation Fund
Milford	Tax goes to the General Fund to offset property taxes $25,000 to Conservation Fund
Mont Vernon	25% directly to Conservation Commission $30,000 to Conservation Fund
Nashua	100% directly to Conservation Commission
Pelham	100% to Conservation Commission
Wilton	10% to Conservation Fund - needs town vote

Source: NRPC Municipal Survey 2021

Map 1
Conserved Lands Labeled



III. OPEN SPACE TRAIL SYSTEM

Pelham enjoys an extensive trail system including well-mapped and signed trails in most of its town forests and conservation lands. Continued maintenance and strategic improvements to these trail systems will be necessary to address the impacts of age, usage, erosion, and other impacts. As improvements are made, it is important that best management practices are followed. In addition, consideration should be given to assessing existing trails for potential impacts to wildlife. Funded by the US Fish and Wildlife Service, the New Hampshire Fish and Game Department recently published *Trails for People and Wildlife - A Guide to Planning Trails that allow People to Enjoy Nature and Wildlife to Thrive*. As noted on the NHFG website, the guide is:

> "a statewide tool that can be used to assess existing trails and site new trails in the most wildlife-friendly way. This mapping tool highlights areas particularly important for wildlife and areas that would be more suitable for trail development. The guidebook explains in more detail how recreation can impact wildlife, how to use the tool to minimize those impacts, and provides some real-world examples of how conservation organizations are using it to make their trail planning efforts most effective."

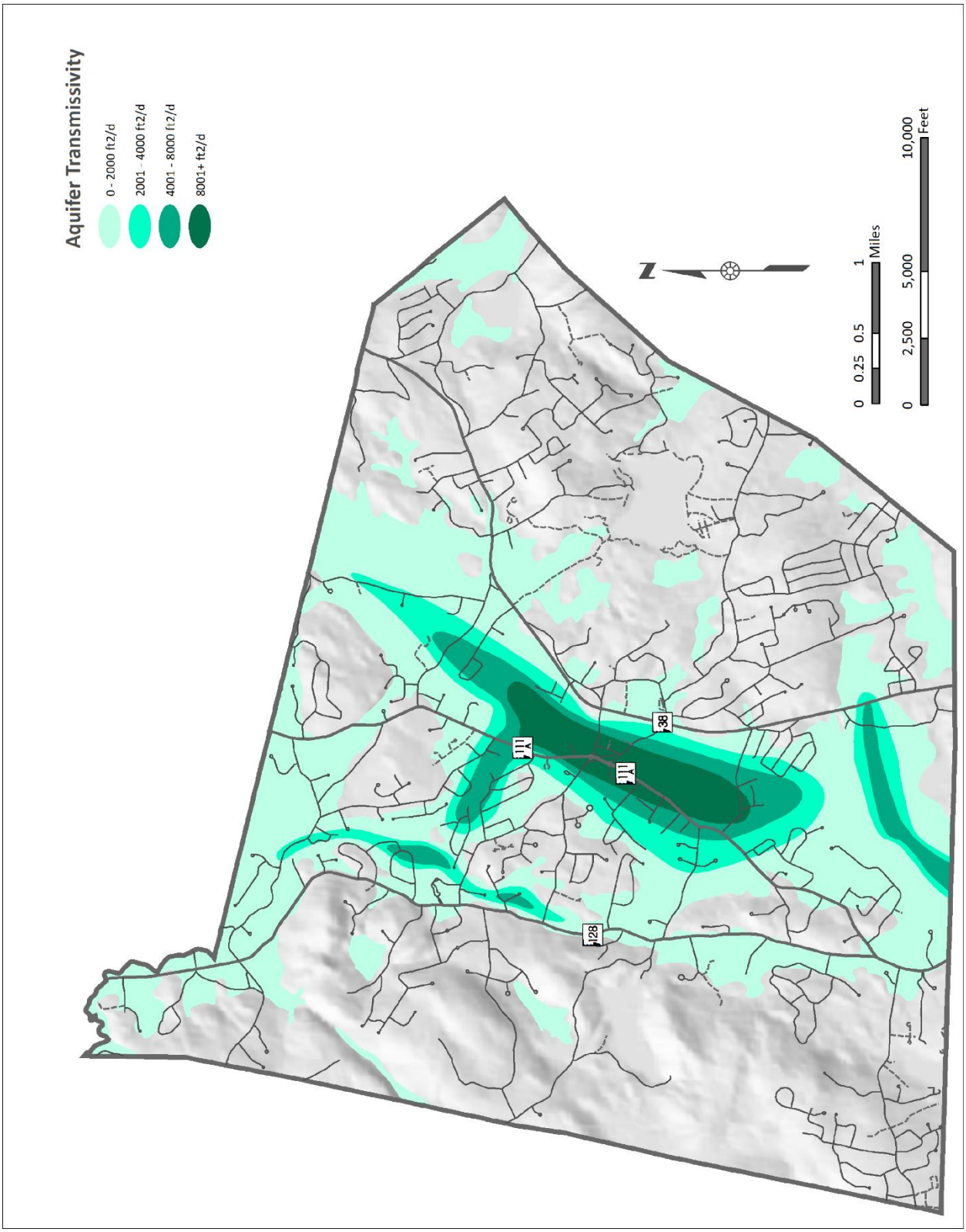
As new trails are planned or improvements to existing trail networks proposed, consideration should be given to using the Trails for People and Wildlife mapping tool to minimize adverse impacts to wildlife while maximizing outdoor recreational opportunities for the people of the town.

IV. DRINKING WATER RESOURCES AND POTENTIAL CONTAMINANT SOURCES

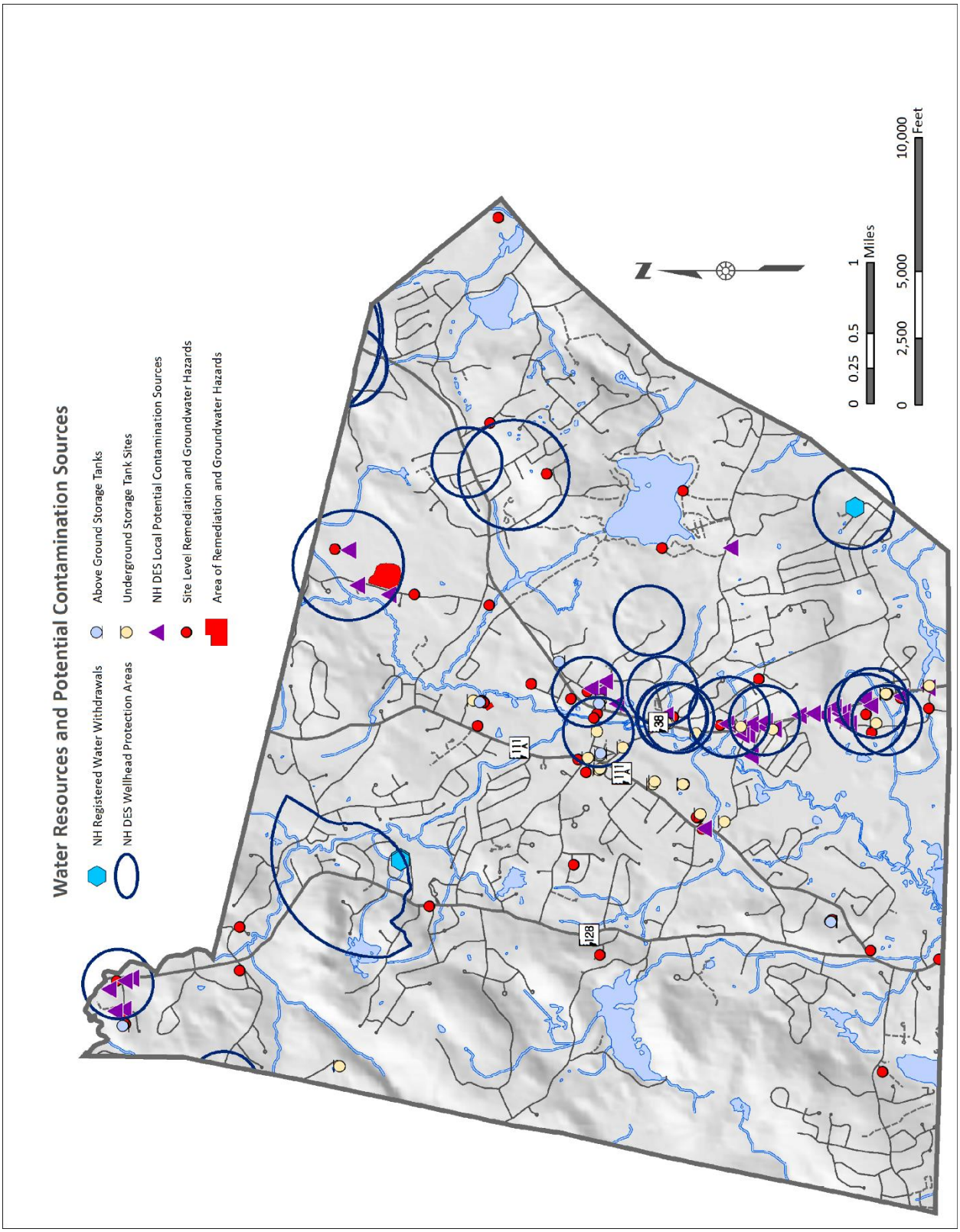
There are two key issues affecting water resources in the region. The first is the increased amount of impervious surface, which reduces the natural infiltration of stormwater and the recharge of groundwater resources. Stormwater contains many sources of contaminants, which are piped or flow over impervious surfaces and drain directly into surface waters without natural soil filtration. Chemicals in runoff can also lead to long term pollution of groundwater. Map #2 illustrates aquifer location and transmissivity in Pelham.

The second issue is the demand for water. The continued growth of Pelham and the NRPC Region has fueled more pressure on current water resources. This makes it imperative to monitor and maintain the quality of all the water resources in Pelham and the region. In the below sections several potential contaminants to the water supplies have been identified and explained further. Map #3 illustrates potential contamination sources.

Map 2
Drinking Water Resources: Aquifer Transmissivity



Map 3
Potential Contaminant Sources



A. Underground Storage Tanks

Leaks in improperly equipped underground storage tanks (USTs) are difficult to detect and may go unnoticed for a long time. Small leaks of only a few gallons can contaminate millions of gallons of ground water. The State regulates USTs where the cumulative volume of all tanks at the facility is 1,100 gallons or more. Some tanks, including those containing non-petroleum-based chemicals and those containing heating oil for on-site residential consumption are exempted. As of 2021, 29 USTs in Pelham were registered with the NH Department of Environmental Services (NHDES), Water Supply and Pollution Control Division. This is a decrease from the 38 reported in 2002.

B. Per-and Polyfluoroalkyl Substances (PFAS)

Per- and Polyfluoroalkyl Substances (PFAS) are a group of synthetic chemicals that have been used for decades to manufacture household and commercial products that resist heat, oil, stains, grease, and water. PFAS have been used in many consumer products, including non-stick cookware, stain-resistant furniture and carpets, waterproof clothing, microwave popcorn bags, fast food wrappers, pizza boxes, shampoo, and dental floss. They have also been used in certain firefighting foams and various industrial processes. The widespread use of these chemicals has led to their appearance in drinking water sources in NH. Recent examples include the widespread contamination of public and private drinking water supplies in Merrimack, Litchfield and Bedford resulting from emissions from the Saint-Gobain Performance Plastics facility in Merrimack that came to light in 2016 as well as the Coakley Landfill and former Pease Air Force Base superfund sites in the Seacoast area. Concern for long term public health prompted legislation enabling the state to set Maximum Contaminant Levels (MCLs) in 2020. These MCL's apply to public water systems and not to private wells, however the NHDES strongly recommends periodic testing of private wells for PFAS among other substances.

C. Household Hazardous Waste

Household Hazardous Wastes (HHW) come from everyday products used in the home, yard, or garden. By definition, they are corrosive, flammable, toxic, or reactive. Examples include; paints, adhesives, solvents, pool chemicals, pesticides, fertilizers, drain openers and auto chemicals. Disposal in the trash, down the sink, into storm drains, or in the woods poses a threat to water quality and may kill fish and wildlife if the chemicals are released into the environment. Household toxins may also injure human and animal health through exposure due to careless storage and handling. NRPC coordinates household hazardous waste collections for 11 communities in the region, including Pelham. In 2021 HHW Collection program removed 134,244 pounds from the waste stream that could have otherwise impacted our environment. Six collection events are scheduled each year between April and November that allow residents to dispose of these products properly. Pelham hosts one hazardous waste collection

every other year (open to all district members) to better serve the eastern reaches of the region. Collection dates and other information can be found at www.nashuarpc.org/hhw.

D. Junkyards

Since 1965, all municipalities in New Hampshire have had the responsibility to license junkyards at the local level. This responsibility is contained in RSA Chapter 236 sections 111 through 129. It applies to all municipalities, whether or not there is a local zoning ordinance. The obligation to license is broad. The landowner does not need to be involved in a commercial operation, or even intend to sell the material. If the material is a motor vehicle or auto parts, an accumulation amounting to two or more vehicles is enough to require a license. Under state statute, it no longer matters whether the vehicles are registered; they become “junk" if they are no longer intended for operation on the highways. The legislature has provided a range of remedial options for use in these cases. In most instances, assistance should be sought from the municipal attorney before commencing a court proceeding. Fines and penalties may be assessed through the court system pursuant to RSA Chapter 236 Sections 127-129. To address the potential impact of junkyards, the Town should consider taking the following enforcement actions.

- Improve the licensing checklist to include the review of the National Pollution Discharge Elimination System permit, especially the facility’s Stormwater Pollution Prevention Plan.
- Enforce licensing requirements of all junkyard facilities.
- Conduct a site walk prior to license renewal to make further recommendations for the protection of natural resources.
- Update and increase the fines for violations.

E. Arsenic and Radon/Uranium

Southern New Hampshire is a rapidly growing region that has been identified as having higher than average concentrations of arsenic and radionuclides in drinking water from groundwater sources. This conclusion is based on the analysis of public bedrock wells as required by the Safe Water Drinking Water Act. According to the USGS, high levels in ground water are probably derived from geologic origins. However, in some areas, arsenic may originate from past human activity such as the use of arsenical pesticides. The quality of water obtained from private wells in New Hampshire is not regulated. Private wells are often not tested unless homeowners are made aware of the need to do so, or if testing is a condition prior to granting an occupancy permit. Fractured bedrock aquifers have the highest risk for arsenic contamination. The State of New Hampshire is aggressively promoting the testing of private wells. It is recommended that residents have their wells tested, and that information concerning arsenic and radon be added to the town website.

F. Stormwater Runoff

The development of land for residential, commercial, or industrial purposes necessarily increases the amount of impervious surface area within any given site due to the construction of buildings, roads, driveways, parking lots and other improvements. Impervious surfaces reduce the natural infiltration of stormwater into the ground, reducing recharge of groundwater resources. This is particularly true where stormwater is discharged into a storm drainage system that exports stormwater off of a site and out of a watershed. Development can also reduce groundwater recharge through increased evaporation resulting from land clearing. Where increased imperviousness results in direct stormwater discharges into streams and rivers, the result is often alteration of the natural flow of the stream, causing erosion and sedimentation, loss of aquatic wildlife habitat and increased flood hazards.

Washington St. Culvert

Because Pelham contains significant areas that are defined as "urbanized" by the US Census, Pelham is subject to federal MS4 stormwater management regulations under the EPA Clean Water Act (CWA) and requires a permit for discharges to the environment. A municipal separate storm sewer system (MS4) includes the stormwater collection, conveyance, and outfall structures within the town. These structures include (but are not limited to) catch basins, drain manholes, culverts, stormwater basins, retention ponds and swales.

Local drainage systems, whether natural or constructed, are important features that generally carry stormwater runoff away from developed areas to undeveloped areas, waterbodies, and wetlands. Although these drainage systems help to manage stormwater in our built environment, they are also a primary source of untreated pollutants in receiving waters including pathogens such as E. Coli; phosphorous; nitrates; heavy metals, oil, MBTE, pesticides, herbicides, and many other pollutants. These untreated pollutants in stormwater runoff are defined by the U.S. Environmental Protection Agency (EPA) as "nonpoint source pollution," meaning that the source of the pollution is not directly attributable to a single spatial point or polluter. Stormwater runoff from streets, parking lots, and lawns picks up and carries contaminants as it moves across the ground surface before entering into local drainage systems. Non-point source pollution and urban runoff in particular, is now acknowledged as being the most serious threat facing surface and groundwater resources in New Hampshire.[1]

Pelham has taken significant steps toward addressing stormwater management and complying with EPA's MS4 Permit requirements. The town has adopted a Stormwater Management Plan, most recently updated in June of 2021, is an active participant in the Lower Merrimack Valley Stormwater Coalition and has a page dedicated to stormwater management on the town's website. The stormwater management page

[1] The NH Department of Environmental Services, *New Hampshire Non-Point Source Management Plan*, 1999. www.epa.gov/npdes

includes an array of useful information sheets and links to resources for homeowners, businesses and other stakeholders on issues including proper septic system maintenance, lawn care, pet waste disposal, and management of construction sites. In addition, Pelham's *Clean Water Initiative* provides educational information and resources to the public on best management practices to prevent adverse stormwater related impacts to the town's surface and groundwater resources.

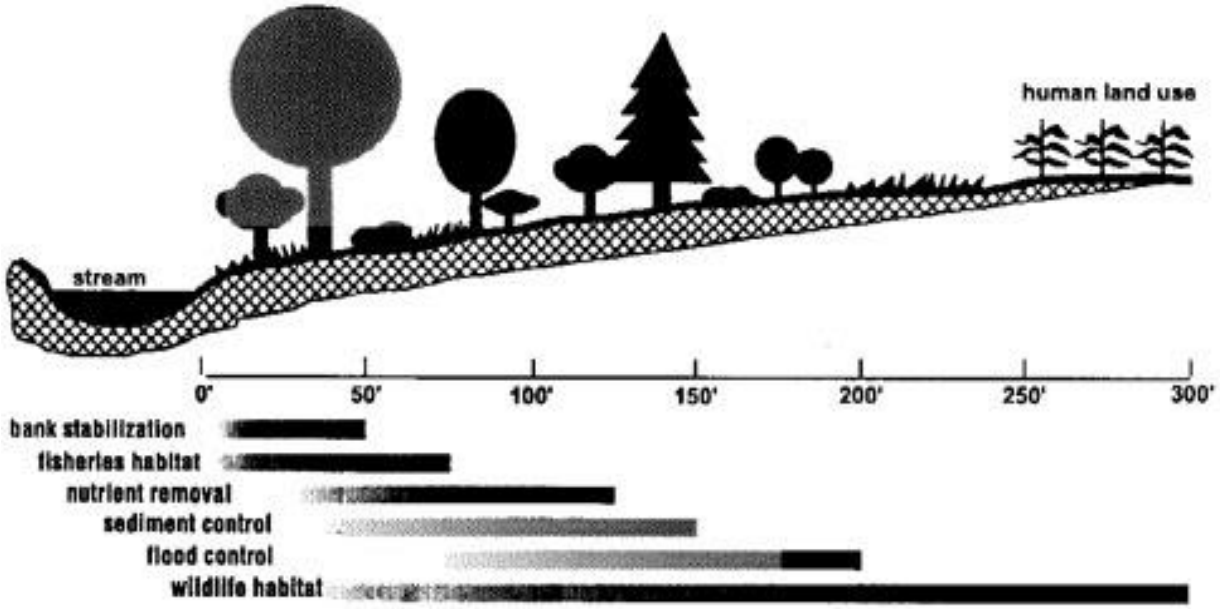
G. Buffer Widths

The following discussion on buffer widths is adapted from the publication "*Riparian Buffers for the Connecticut River Watershed*" prepared by the Connecticut River Joint Commissions of New Hampshire and Vermont in 2000. The Commission is made up of Federal, state, and private organizations. There is no single generic buffer which will keep water clean, stabilize banks, protect fish and wildlife, and satisfy human demands on the land. The minimum acceptable width is one that provides acceptable levels of all needed benefits at an acceptable cost, typically 50' from the top of the bank. Each foot of additional width increases the effectiveness of the buffer. Buffers are useful for the following purposes:

To Stabilize Eroding Banks. Good erosion control on smaller streams may require no more than shrubs and trees or a managed grass buffer. If there is active bank erosion, or on larger streams, more than 50' may be necessary. Severe bank erosion on larger streams requires engineering to stabilize and protect the bank – effective engineered solutions can be accomplished with selective vegetative cover.

To Filter Sediment and Attached Contaminants from Runoff. For slopes less than 15%, most sediment settling occurs within a 35' wide buffer of grass. Greater width is needed on steeper slopes or where sediment loads are particularly high.

To Filter Dissolved Nutrients and Pesticides from Runoff. A width up to 100' or more may be necessary on steeper slopes and less permeable soils to allow runoff to soak in sufficiently, and for vegetation and microbes to work on nutrients and pesticides. Most pollutants are removed within 100', although in clay soils, may require up to 500'.



Source: Connecticut River Joint Commissions of New Hampshire and Vermont

V. WETLANDS AND VERNAL POOLS

A. Wetlands

Wetlands perform many irreplaceable functions within the hydrologic system of each watershed. Wetlands provide a vital link between incoming precipitation and aquifer recharge, flood storage and prevention; erosion control, water purification of sediment, contaminants, and problem nutrients (phosphorus/nitrogen). They also provide important habitat to a variety of plant and animal life, including aquatic plants, insects, amphibians, fish, and waterfowl. The role of education in understanding the importance and sensitivity of wetlands cannot be overestimated. Promoting the development of school and public environmental education programs that utilize the outdoors as natural classrooms, such as the U.S. Fish and Wildlife's Schoolyard Habitat Program2 is an effective way of increasing community awareness.

Pelhams' Zoning Ordinance defines a wetland as follows:

> "Wetland: a wetland is an area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions, does support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include, but are not limited to, swamps, marshes, bogs, and similar areas. Wetlands shall be delineated by either a certified soil scientist or a professional wetland scientist according to the Corps of Engineers Wetlands Delineation Manual, 1987, and the Regional Field Indicators for Identifying Hydric Soils in New England, 1995. [Amended by ballot ATM March 1998]"

[2] U.S. Fish and Wildlife Service, *Schoolyard Habitat Project Guide,* 1999.

The designation of wetland areas is the first step in developing a protection plan or strategy. Wetland designation involves determining the location or extent of any areas that support typical wetland soils and vegetation. The existence of either wetland soils or vegetation is the result of water table characteristics, which cause frequent flooding or saturation of the soil. Map #4 illustrates the surface waters and prime wetland designation in Pelham.

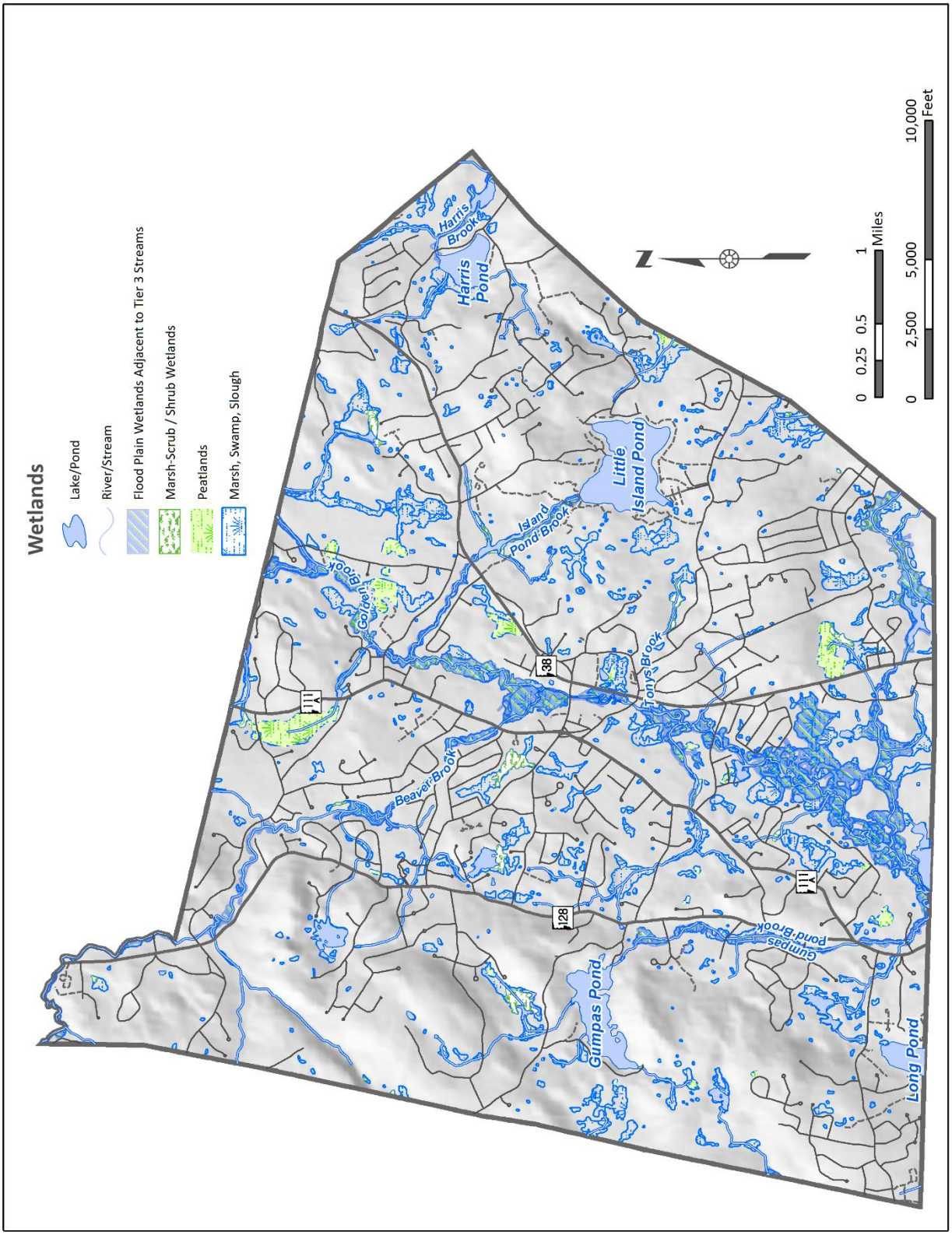
Many of the municipalities in the Region still define wetlands on the basis of hydric (poorly and very poorly drained) soils, however, this is not based on the currently accepted federal definition which includes wetland hydrology and vegetation in addition to soils. More accurate wetland delineation is made possible by the 3-fold definition. Given the detrimental effects of excessive nutrient loading can have on water resources, it is important that septic systems and leachfields be set back far enough from wetlands to prevent their accelerated eutrophication.

Table 2
Summary of NRPC Region Wetland Ordinance Provisions

Town	Wetland District Definition	Wetland Buffers/Setbacks
Amherst	Poorly and very poorly drained soils, water bodies.	Septic tanks and leachfields: 75 feet No structures within 50 feet.
Brookline	Poorly and very poorly drained soils, water bodies.	All wetlands: 50 feet Septic tanks and leachfields: 75 feet except for areas with rapid/very rapid permeability-125 feet. No new structures within 25 feet.
Hollis	Poorly and very poorly drained soils, water bodies.	Septic tanks and leachfields: 100 feet No new structures within 100 feet.
Hudson	3-fold definition: wetland soils (very poorly and poorly drained), wetland vegetation, wetland hydrology.	No new structures or parking lots within 25 feet. Septic tanks and leachfields: 25 – 75 feet depending on soils.
Lyndeborough	Poorly and very poorly drained soils, water bodies.	No buffers
Litchfield	3-fold definition: wetland soils (very poorly and poorly drained), wetland vegetation, wetland hydrology.	Septic tanks and leachfields: 100 feet No new structures within 75 feet. Basin marshes, bogs, fens, and vernal pools: 200 feet
Merrimack	Poorly and very poorly drained soils, water bodies.	Septic tanks and leachfields: 75 feet No new structures within 40 feet.
Milford	3-fold definition: wetland soils (very poorly and poorly drained), wetland vegetation, wetland hydrology.	All wetlands: 25 feet Designated streams and wetlands: 50 feet No new structures within 50 feet.
Mont Vernon	Poorly and very poorly drained soils, water bodies.	All wetlands except vernal pools: 25 feet
Nashua	3-fold definition: wetland soils (very poorly and poorly drained), wetland vegetation, wetland hydrology.	75 feet on prime 40 feet on critical
Pelham	Wetland soils and vegetation.	Septic and leachfields: 50 – 75 feet depending on soils.
Wilton	3-fold definition: wetland soils (very poorly and poorly drained), wetland vegetation, wetland hydrology.	No buffers

Source: NRPC survey of local wetland ordinances, 2021.

Map 4
Wetlands



Accurate field surveys are essential for identifying wetlands. Trained botanists, wetland scientists, ecologists, soil scientists, and hydrologists, can provide the highest level of information needed. This information should be incorporated into any land use decision-making process. In addition, NH RSA 482-A:15 authorizes municipalities to designate certain high value wetlands as "prime wetlands" to provide a greater degree of protection. As noted by NHDES, "a wetland typically receives this designation because of its large size, unspoiled character and ability to sustain populations of rare or threatened plant and animal species."

NH RSA 482-A:15. Defines prime wetlands as "[ ] any contiguous areas falling within the jurisdictional definitions of RSA 482-A:2, X and RSA 482-A:4 that, because of their size, unspoiled character, fragile condition, or other relevant factors, make them of substantial significance. A prime wetland shall be at least 2 acres in size, shall not consist of a water body only, shall have at least 4 primary wetland functions, one of which shall be wildlife habitat, and shall have a width of at least 50 feet at its narrowest point. The boundary of a prime wetland shall coincide, where present, with the upland edge of any wetland, as defined in RSA 482-A:2, X, that is part of the prime wetland."

The New Hampshire Method of Evaluating Wetlands was developed in 1993.[3] A prime wetland is a wetland that is worthy of extra protection because of its unspoiled character, uniqueness, or fragility. All prime wetlands must have over 50% hydric A soil, which are very poorly drained soils. The New Hampshire Method uses a ranking system based on 12 criteria. These criteria are as follows: Ecological Integrity, Wildlife Habitat, Fin Fish Habitat, Educational Potential, Aesthetic Quality, Water Based Recreation, Flood Control Potential, Groundwater Use Potential, Sediment Trapping, Nutrient Filtering, Urban Quality of Life Potential, and Historical Site Potential.

In 1987 the Conservation Commission prepared the Pelham Prime Wetlands Study based on nine criteria. The criteria included the following: Flora, Fauna, Food chain production, Hydrology, Historical, Archaeological and/or Scientific Significance, Geomorphologic Features, Aesthetics, Size, and other considerations. The Study identified 46 areas initially and narrowed the list down to 11 for further consideration. Seven wetlands were chosen for inclusion in a zoning overlay district at Town Meeting in 1988.

The Town contracted with the University of New Hampshire in 1999 to continue the evaluations started in 1987.[4] Using the New Hampshire Method, the assessment concluded that four additional wetland systems were worthy of prime wetland status. One wetland, the Pelham Memorial School Wetland, did not meet the hydric A soil requirement for the New Hampshire Method by a small margin and cannot be designated as a prime wetland according to the New Hampshire Code of Administrative Rules. Nevertheless, this wetland system did rank high in the 12 categories and should be re-evaluated and protected. Additional studies were undertaken in 2007 and 2008. In 2022, the Prime Wetlands identified in the 1987 and 1999 studies were redefined by Town Meeting.

[3] Amman, A., and A. L. Stone, *A Method for the Comparative Evaluation of Non-Tidal Wetlands in New Hampshire*, 1991.
[4] University of New Hampshire, *Pelham Prime Wetland Assessment*, 1999.

Map 5
Prime Wetlands

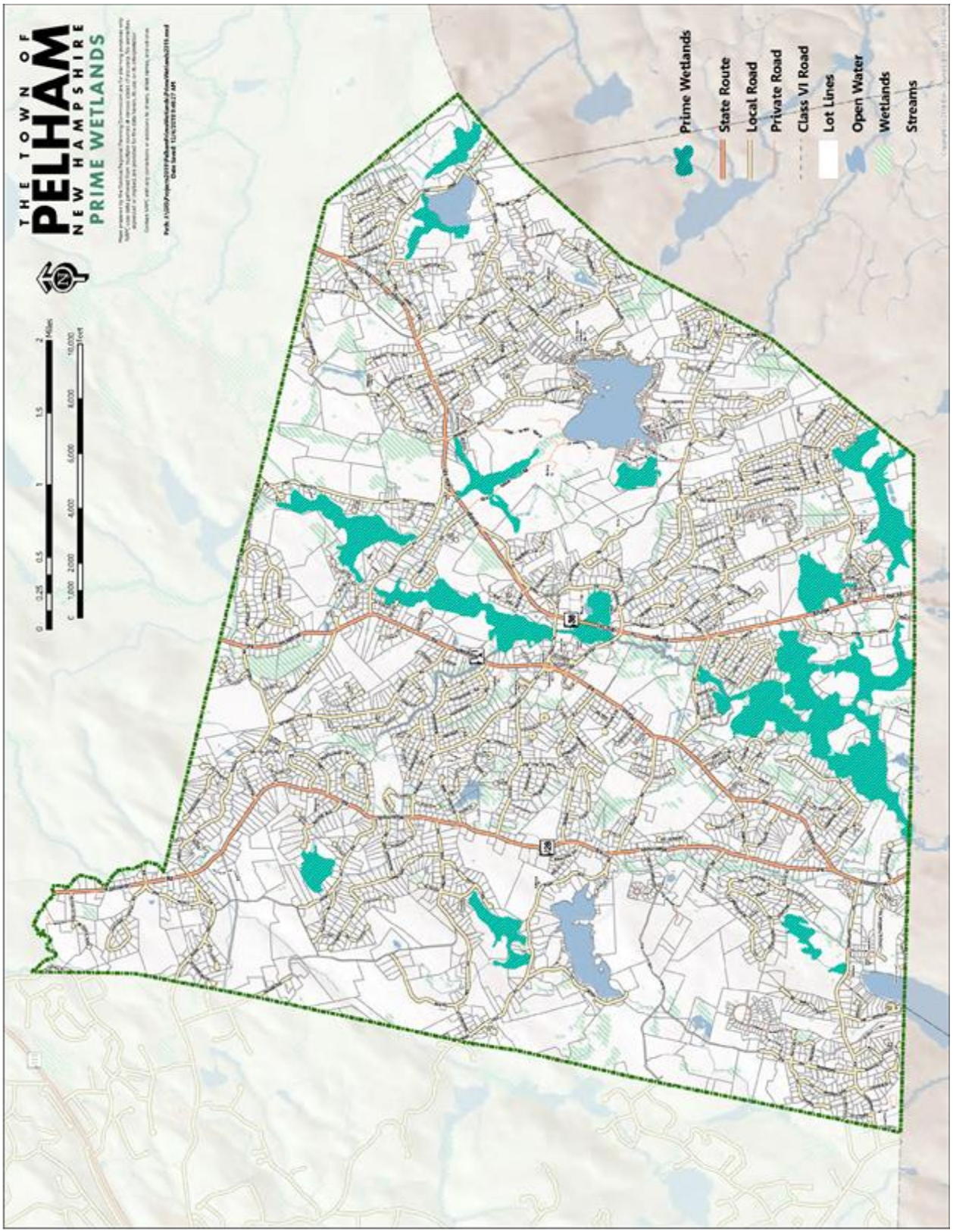


Table 3
Very Poorly and Poorly Drained Soils in Pelham

Very Poorly Drained Soils	Poorly Drained Soils
Borohemists (BoA, BpA)	Leiceter-Walpole Complex (LtA, LtB, LvA, LvB)
Chocorua Mucky Peat (Cu)	Pipestone (PiA, PiB)
Greenwood Mucky Peat (Gw)	Ridgebury (ReA)
Scarboro (So, Sr)	Rippowan (Rp)

Source: Soil Survey of Hillsborough County, New Hampshire, Eastern Part,

US Department of Agriculture, Soil Conservation Service, 1980.

The proximity of these soils to low-lying areas or to surface waters constitutes supporting evidence for the sensitivity of these areas and their importance as wetlands. The amount and location of incoming run-off, slope, accessibility of natural drainage features, and seasonal wet conditions are all important points to consider in documenting the sensitivity of a particular wetland area.

Gumpas/Cutler Conservation Area

Wetland areas are for the most part located adjacent to or very near open water as found in the Town's rivers, streams, and ponds. This relationship is the result of a localized higher water table and the source of greater quantities of soil water during periods of high stream flow. There are also some scattered pockets of wetland soils throughout the Town, usually at the bottom of low-lying areas or depressions.

The next step in protecting wetlands is setting the priority of wetland areas based on their location and the benefits provided. These efforts can be documented in a protection plan or strategy. For example, wetlands adjacent to a stream may warrant a higher local priority for protection than an isolated wetland "pocket". This does not mean that these pocket wetlands do not perform valuable functions. The University of New Hampshire is currently studying the value of these wetlands. Other available ways to gain better control of wetland areas considered important are through town regulations, conservation easements, deed restrictions, and the fee-simple purchase of development rights or land. Since overcoming the problems in the development of sites with these conditions is quite costly, and since hazardous conditions may result if improperly developed, these areas are recommended for use as open space. This restriction will allow these areas to continue their functions as unique wildlife habitats and as natural purification sites for the recharge-discharge of groundwater supplies. It is recommended that development of wetland areas continue to be restricted in the future through the Town's Wetland Conservation ordinance. This, combined with active enforcement of State regulations governing the location of septic system and along with the possibility of the Town adopting greater setback distances than the State's minimum, will ensure that these areas may continue to perform the natural functions for which they are best suited.

B. Vernal Pools

Vernal or “spring” pools are essential for the life cycle of many invertebrates and amphibians. These temporary forested wetlands serve as a home to many of these species, which feed on nutrients in the pool. Pools can range in size from a few feet to several acres. Vernal pools are generally associated with forested wetlands, but can also be found within larger wetlands, such as oxbows in river floodplains or scrub-shrub wetlands. Most vernal pool animals do not live their entire lives in the pool but migrate in response to snow melt and early spring rains. The pools generally dry up by mid to late summer. Depending on the groundwater, some pools will refill in the autumn. Mole salamanders and wood frogs

spend 90% of their lives in the surrounding uplands, perhaps as far as a quarter mile from the pool. Adults migrate to the pool for a few weeks to reproduce and surviving juveniles leave before the water dries.

Other organisms (e.g., snakes, turtles, insects, and birds) migrate from nearby wetlands to breed or feed in the productive pool waters. These animals return to more permanent wetlands. Other animals develop entirely in the pool and most survive the dry season. For example, fingernail clams and air-breathing snails burrow beneath the leaves that remain to await the return of water. Fairy shrimp deposit eggs in the dry pool that hatch after the pool refills.

The New Hampshire Fish and Game Department advocates identification of vernal pools as important wildlife habitat and wetlands of significance and provides guidance for their protection.[5]
Goals developed for future natural resources protection should include the documentation of important vernal pools and the protection of these natural resources to help ensure the biodiversity of the area. The identification and mapping of vernal pools on site plans and subdivision plans will provide an opportunity to mitigate the impacts to these sensitive areas.

The only vernal pools noted in Pelham were in the eight Forestry Management Plans prepared for the Town Forests. Although many pools may be known in the community, they are not recorded. The New Hampshire Fish and Game Department's Non-Game and Endangered Wildlife Program collects information on any reptile and amphibians sighted. Volunteers equipped with field guides and report forms identify these creatures on warm, rainy nights in the spring. The Reptile and Amphibian Reporting Program (RAARP)[6], provides important baseline data for species in need of protection.

Pelham has made significant strides in protecting wetlands including the designation of significant prime wetland areas and the acquisition of additional conservation land. However, the town's Wetlands Conservation District has not been updated since 2005. The existing ordinance lacks defined buffer areas and has no specific provisions related to prime wetlands or vernal pools. The town should consider undertaking a comprehensive update of its Wetlands Conservation District to better reflect changing best practices, development patterns and emerging threats.

[5] NH Fish and Game Department, Nongame and Endangered Wildlife Program, *Identification and Documentation of Vernal Pools in New Hampshire*, 2001.

[6] www.wildlife.state.nh.us

VI. SURFACE WATER RESOURCES

Surface water resources, including streams, lakes, and ponds, provide storm drainage, storage, groundwater recharge, wildlife habitat, water supplies, and active or passive recreation. The Town's major streams are Beaver Brook, Golden Brook, Island Pond Brook, and Gumpas Pond Brook. Over 35 miles of perennial streams flow through Pelham. Although they may represent a small portion of the Town's land area, they are an important resource to consider relative to the Town's existing and future growth. Because of the extensive network they form and the interconnection between surface waters and groundwater, all the Town's surface waters are important.

Water quality classifications are established by the legislature. The classification represents the desired level of water quality for the stream and does not necessarily reflect actual conditions. In many instances water quality in a river or stream does not meet the standards of the legislative classification. All the streams in Pelham have a legislative water quality classification of B. This means they either meet the stated criteria or have a goal to achieve the fishable and swimmable criteria established under the Clean Water Act. Characteristics of Pelham's perennial streams are summarized in the table below and depicted on Map #6: Water Resources.

Table 4
Perennial Streams in Pelham

Name Number	Total Length (in miles)	Miles in Pelham	Start Elevation (in feet)	End Elevation (in feet)	Stream Order	Feeder Streams (in miles)
Beaver Brook	26.8	9.8	300	60	4th	62.6
Two-a	1.2	1.2	310	170	2nd	0.75
Three-a	1.2	1.2	260	140	1st	0
Four-a	1.2	1.2	270	140	2nd	1.3
Five-a	0.6	0.6	170	140	1st	0
Golden Brook	5.8	1.3	180	130	3rd	11.2
Seven-a	2.4	2.1	185	140	1st	0.1
Harris Pond Brook		0.8	160	150	2nd	0.8
Eight-b	0.8	0.8	190	150	1st	0
Island Pond Brook	1.7	1.7	140	130	2nd	0.8
Bartlett Brook		0.4	170	160	1st	0
Thirteen-a	5.5	4.2	190	120	2nd	3.2
Thirteen-b	1.3	1.1	140	130	1st	0
Thirteen-c	1.4	1.3	190	130	1st	0
Thirteen-d	0.5	0.5	140	130	1st	0
Tony's Brook	0.9	0.9	150	130	1st	0
Fifteen-a	2.3	2.3	170	140	2nd	1.4
Gumpas Pond Brook	2.5	2.5	220	135	3rd	2.6
Eighteen-a	1.6	0.7	310	200	2nd	0
Nineteen-a	0.8	0.8	290	140	1st	0

Source: NRPC, Pelham Water Resources Management Plan, 1988.

Pelham's lakes and ponds are also a very important surface water resource, providing wildlife habitat, water supply, flood control, and outdoor recreational opportunities. An inventory of Pelham's lakes and ponds is presented in Table #5 on the following page, and all surface waters are represented on Map #6: Water Resources.

Table 5
Lakes and Ponds in Pelham

Name of Water	Size		Description
Gumpas Pond	Area: 89.9 acres		Class: Mesotrophic
Data collected in 1994	Shoreline: 2.7 miles Abundant vegetation		Max. Depth Sounded: 24 feet Secchi Disk: 5.36 meters
	Average Depth: Unknown		Elevation: 201
Harris Pond	Area: 45.7		Class: Mesotrophic
Data collected in 1994	Shoreline: 1.1 miles Abundant vegetation		Max. Depth Sounded: 22 feet Secchi Disk: 3.78 meters
	Average Depth: Unknown		Elevation: 152
Little Island Pond	Area: 159.24 acres		Class: Oligotrophic
Data collected in 1992	Shoreline: 4.8 miles Sparce vegetation		Max. Depth Sounded: 55 feet Secchi Disk: 5.49 meters
	Average Depth: Unknown		Elevation: 145
Long Pond	Area: 120.5		Class: Oligotrophic
Data collected in 1978	Shoreline: 3 miles Common vegetation		Max. Depth Sounded: 25 feet Secchi Disk: 4.39 meters
	Average Depth: 13 feet		Elevation: 151

Source: Survey Lake Data Summary, NH Department of Environmental Services, Retrieved 2021.

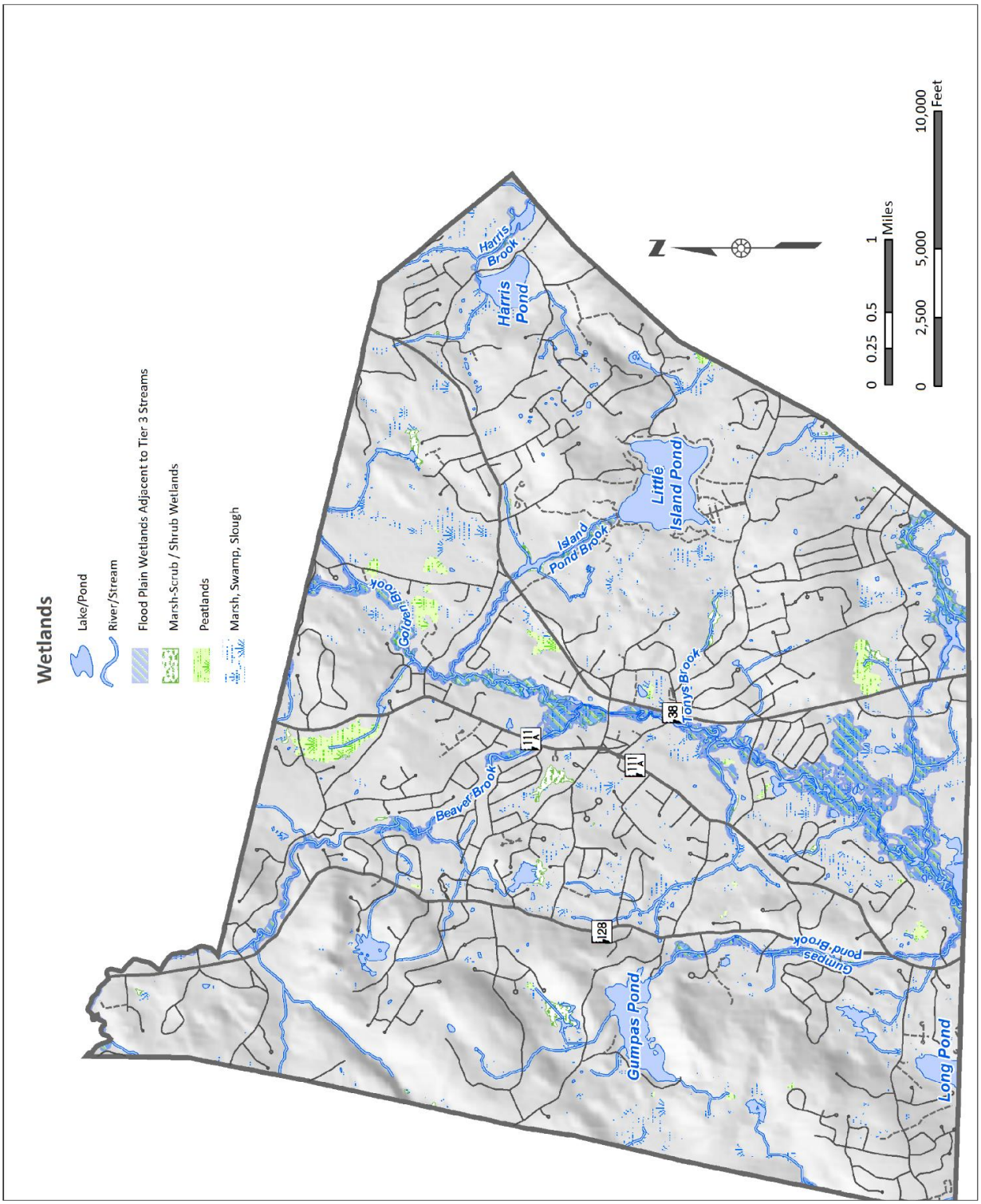
According to the data collected by the Department of Environmental Services (DES) the ponds in Pelham appear to be reasonably healthy, though on-going monitoring is important to identify changes in water quality. Little Island Pond classified as Oligotrophic. This is the highest lake classification with low biological production and nutrients. Gumpas, Harris, and Long Ponds are classified as Mesotrophic which is characterized by somewhat higher biological production and nutrients and less clear water. Biological production increases with increased lake fertilization. Biological production also increases with increased nutrient input due to runoff. The key nutrient in the eutrophication process or lake aging is the chemical phosphorus.

Lake aging is a natural process by which the lake fills in with sediment over geologic time. Phosphorus is the limiting nutrient in New Hampshire lakes; the greater the phosphorus concentration in a lake, the greater the biological production. Biological production can be measured in terms of plant growth, algal growth, decreased transparency, and an overall decrease in lake quality.

The level of concern established by DES for phosphorus is 0.02 mg/L. Harris Pond was the only water body that exceeded the level of concern with a reading of 0.023 mg/L. Long Pond is a phosphorus water quality limited waterbody according to the EPA's 303(d) list.

Transparency, a measure of water clarity, is affected by the amount of algae and particulate matter within a water body. Transparency is measured with a 20-centimeter disk with alternating black and white quadrants called a Secchi disk. The disk is used to measure the depth that the disk can be seen below the water surface. The mean transparency of New Hampshire lakes is 3.7 meters (one-meter equals 3 ft. 4in.), which is in the "good" range. Little Island Pond (5.49 m or 18 ft.) had water clarity in the "exceptional" range. The other ponds were in the "good" range.

Map 6
Surface Water Resources



There are currently 22 species of non-native aquatic plants that can create problems if allowed to propagate in a water body. They spread rapidly, forming thick underwater strands of tangled stems and vast mats of vegetation at the water's surface. In doing so, they crowd out important native water plants. As of January 1, 1998, it became illegal to transport, purchase, sell, or distribute the 22 species of non-native aquatic plants listed in Table #6, below, in New Hampshire. Before and after boating, the boat and trailer should be inspected for any plants. Plants that are found should be discarded away from any water source. According to the DES Biology Bureau Pelham is fortunate not to have any exotic plant species or excessive vegetation growth in the four ponds.

Table 6
Prohibited Exotic (Non-Native) Aquatic Plant Species

Latin Name	Common Name
All *Myriophyllum* species	Milfoils or feather-foils
All *Cabomba* species	Fanworts
Hydrilla verticillata	Hydrilla or Anacharis
All *Trapa* species	Water chestnut
Potamogeton crispus	Curly-leaf pondweed
Lythrum salicaria	Purple loosestrife
Phargmites australis or *P. communis*	Common reed
Egeria densa	Brazilian elodea
Hydrocharis morsus-ranae	European frogbit
Butomus umbellatus	Flowering rush
Najas minor	European naiad
Nymphoides peltata	Yellow floating heart
Crassula helmsii	Swamp stonecrop
Epilobium hirsutum	Great willow herb or hairy willow herb
Glyceria maxima	Reed sweet grass or manna grass
Hygrophila polysperma	East Indian Hygrophila
Ipomoea aquatica	Water spinach
Iris pseudocarus	Yellow iris or yellow flag iris
Lagarosiphon major	African oxygen weed
Limnophila sessiliflora	Ambulia
Marsilea quadriflora	Water fern
Myosotis scorpioides	Water forget-me-not

Source: NHDES Fact Sheet, WD-BB-40, 2019

The Volunteer Lake Assessment Program (VLAP) [7] was initiated in 1985 so the hundreds of lakes in the state could be more closely monitored. Lake residents and lake associations are trained by DES to sample the lake and to survey the surrounding watershed. Samples are also taken from the tributaries (streams flowing into the lake). Regular sampling of water quality data from the lake and the streams that enters it builds a strong set of baseline data. Such monitoring results in early detection of water quality changes, allowing DES to trace potential problems to their source. If the data gathered in VLAP reveals that there is a water quality problem in a particular waterbody, the data may be used to justify the need for the implementation of a more intensive watershed study through the NH Clean Lakes Program, the Federal

[7] https://www.des.nh.gov/water/rivers-and-lakes/volunteer-assessment-programs

Clean Lakes Program, or the Non-Point Source Local Watershed Initiatives Grant Program. Long Pong is currently the only pond in Pelham that participates in VLAP. It is highly recommended that monitoring continues on all the ponds in Pelham.

A. Riparian Buffers/Streamside Forests

The importance of surface water resources in the protection of water quality requires that they be treated with care in the land use planning process. It is recommended that land areas adjacent to surface water resources be protected by restricting their development from active use. These areas can be safely developed within a protective buffer to meet the community's needs for recreation and open space.

Buffers consisting of an herbaceous layer (groundcover/vines), understory plants consisting of shrubs, grasses, sedges, and trees ranging from 1 to 15 feet, and mature trees are recommended for maximum nutrient uptake and wildlife habitat. The State of New Hampshire has not adopted a standard buffer width. It is generally recommended in scientific literature, that a minimum 100-foot buffer be used. There are many considerations when considering the width of buffers including but not limited to hydrology, topography, and the presence of threatened or rare and endangered species. The buffers will also provide protective greenways that minimize any land use impacts that may be created by permitted development. This not only protects the water quality, but also enhances the value of the surface water resources by allowing them to continue to support a community of wildlife within and around them. In addition, the connected surface water resource then serves as the basis for a natural system of open space around which development can occur.

B. Shoreland Protection Act

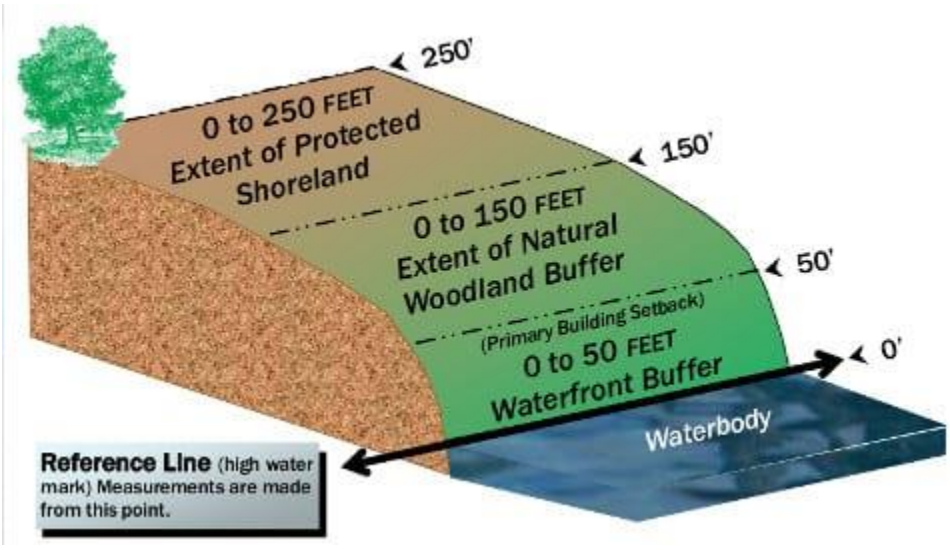
The Shoreland Water Quality Protection Act, originally named the Comprehensive Shoreland Protection Act (CSPA), was enacted into law in the year 1991. Significant amendments were passed in 2008. The Act establishes minimum standards for the subdivision, use and development of shoreland areas adjacent to the state's public waters. When repairs, replacements, improvements, or expansions are proposed for existing development, the law requires these alterations to be consistent with the intent of the Act. Development within the protected shoreland must always comply with all applicable local and state regulations.

Protected shoreland includes all-natural freshwater bodies without artificial impoundments, artificially impounded freshwater bodies, rivers, coastal water, and all land located within 250 feet of the reference line of public waters. Public waters are all waterbodies with a surface area of ten or more acres, all fourth order or higher watercourses, estuaries, and coastal waters. Long Pond, Harris Pond, Little Island Pond, Gumpas Pond, and Beaver Brook are the only waterbodies that fall under the provisions of the Act. The reference line for these ponds is the natural mean high-water level. No fertilizer, including organic products, can be used within 25 feet of the reference line. Between 25 and 250 feet of the reference line, only low phosphate (2% or less), slow-release nitrogen fertilizer or limestone may be used.[8] Natural woodland buffers must adhere to the following:

1. Where existing, a natural woodland buffer must be maintained within 150 feet of the reference line.
2. Tree cutting is limited to 50% of the basal area of trees, and maximum of 50% of the total number of saplings in a 20-year period.
3. A healthy, well-distributed stand of trees must be maintained.
4. Stumps and their root systems must remain intact in the ground within fifty feet of the reference line.

[8] NHDES Environmental Fact Sheet, Lawn Care within the Protected Shoreland 2020

Merriam Cutter Conservation Area (Unnamed Pond)



Source: A guide to Developing and Re-developing Shoreland Property in New Hampshire, 1995.

Illustration Credit: Bill Hoffman, Landscape Architect.

VII. WILDLIFE AND PLANTS

Pelham's natural resource base provides a habitat for many plant and animal species. A variety of habitats such as wetlands, forests, fields, rivers, and streams are essential to support a diversity of species in quantities healthy enough to ensure continuation of the species. Maintaining quality habitats is crucial to the continuation of all plant and animal species.

The New Hampshire Natural Heritage Bureau (NHB), a bureau of the Division of Forests & Lands, tracks threatened and endangered species and exemplary natural communities in the State. Using a ranking system developed by the Nature Conservancy, the NHB assesses the rarity of a species on a global and state level and compiles the Natural Heritage Inventory (NHI). State listing ranks are defined by New Hampshire Code of Administrative Rul**es** (RSA 217-A:3). The NHB records five terrestrial (forest) and two palustrine (wetland) exemplary natural communities in Pelham. Five of the seven listed are ranked as the highest importance in New Hampshire. The rating is based on a combination of the rarity, size, and health of the community.

There are 170 natural community types described by the New Hampshire Natural Heritage Inventory Program. Natural communities are basically groupings of plants that occur together in recurring patterns based on water, soils, climate, and nutrients. These communities represent intact examples of New Hampshire's native flora (plants) and fauna (animals). A complete NHI listing of the exemplary natural communities or rare species for Pelham is provided in Table 7. Map 7 illustrates habitat types in Pelham. The suitability of various habitats to support wildlife are affected by the features of a particular place including the size of the area, proximity to other habitat types, proximity to developed areas and other factors. New Hampshire Fish & Game (NHFG) developed a method to assess the relative ecological condition of habitats through the use of statewide GIS data that represents species diversity, landscape context and human impacts. The data was first developed in 2006 and most recently revised in 2015. For 2015, several regional datasets were used.

The NHFG rating system is based on three variables: biological diversity, landscape context, and impacts of human activities. Habitats are ranked to identify priority conservation targets across all habitat types. The results of this analysis are shown on Map 8. The largest concentration of highest tier habitat is located in Musquash Brook and Gumpas Pond Watershed areas.

Table 7
New Hampshire Natural Heritage Inventory
Rare Species and Exemplary Natural Communities List for Pelham

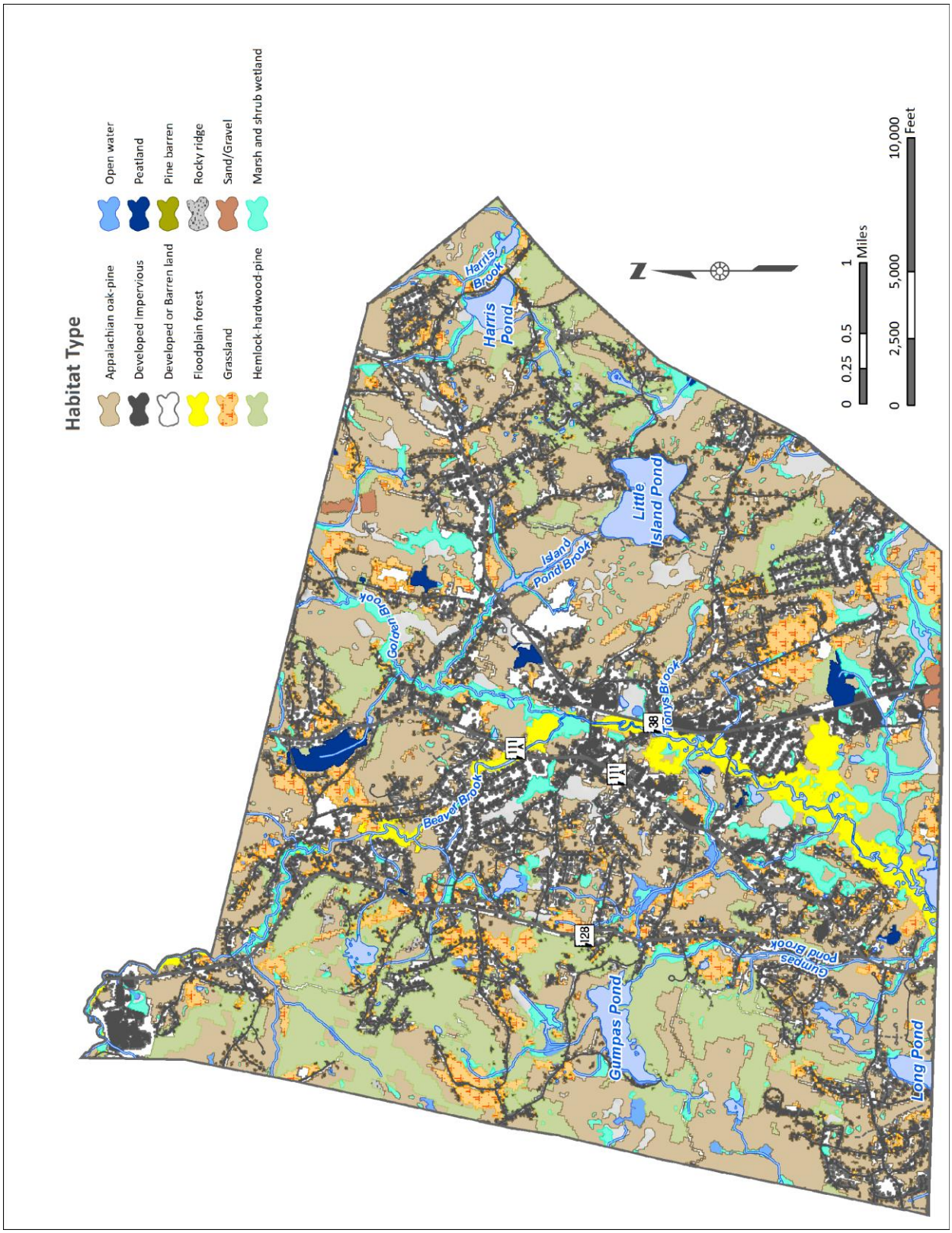
				# Locations Listed in the last 20 Years	
Flag	**Species or Community Name**	**Federal**	**State**	**Town**	**State**
	Natural Communities – Terrestrial				
~	-Dry Appalachian oak forest	-	-	Historical	15
~	- Red oak - ironwood - Pennsylvania sedge woodland	-	-	Historical	12
***	- Rich Appalachian oak rocky woods	-	-	1	17
	Natural Communities – Palustrine				
~	- Atlantic white cedar - yellow birch - pepperbush swamp	-	-	Historical	16
~	- Sandy pond shore system	-	-	Historical	12
~	- Swamp white oak floodplain forest			1	7
	Plants				
**	anemone meadow-rue - Thalictrum thalictroides	-	E	1	8

**	bashful clubsedge - Trichophorum planifolium	-	E	2	4
**	bird-foot violet - Viola pedata var. pedate	-	T	4	17
**	black-seeded spear grass - Piptochaetium avenaceum	-	E	1	1
**	blue sedge - Carex glaucodea	-	T	2	8
**	blunt-lobed cliff fern - Woodsia obtusa ssp. Obtuse	-	E	1	11
**	brown bog sedge - Carex buxbaumii	-	E	1	2
~	bulbous bitter-cress - Cardamine bulbosa	-	E	Historical	5
**	button sedge - Carex bullata	-	E	1	7
**	clasping milkweed - Asclepias amplexicaulis	-	T	1	15
~	clustered sedge - Carex cumulate	-	T	Historical	20
**	common star-grass - Hypoxis hirsute	-	T	4	20
~	dragon's-mouth - Arethusa bulbosa	-	E	Historical	24
~	early crowfoot - Ranunculus fascicularis	-	E	Historical	4
**	eight-flowered six-weeks grass - Vulpia octoflora var. tenella	-	E	1	5
**	four-leaved milkweed - Asclepias quadrifolia	-	E	3	10
~	greater fringed-gentian - Gentianopsis crinite	-	T	Historical	30
***	hairy bedstraw - Galium pilosum var. pilosum	-	E	1	6
***	hoary mountain-mint - Pycnanthemum incanum var. incanum	-	E	3	6
***	late purple American-aster - Symphyotrichum patens var. patens	-	T	4	12
**	licorice goldenrod - Solidago odora ssp. Odora	-	T	1	26
~	long-headed windflower - Anemone cylindrica	-	E	Historical	11
**	lopsided rush - Juncus secundus	-	E	2	8
***	meadow garlic - Allium canadense var. canadense	-	E	1	5
~	narrow-leaved pinweed - Lechea tenuifolia	-	E	Historical	4
~	narrow-leaved white-topped-aster - Sericocarpus linifolius	-	E	Historical	5
~	northern wild senna - Senna hebecarpa	-	E	Historical	10
**	palmate violet - Viola palmata var. palmata	-	E	1	3
~	purple milkweed - Asclepias purpurascens	-	E	Historical	4
**	red threeawn - Aristida longespica var. geniculate	-	T	2	18
***	river birch - Betula nigra	-	T	1	10
~	rock muhly - Muhlenbergia sobolifera	-	E	Historical	6
***	round-leaved trailing tick-trefoil - Desmodium rotundifolium	-	T	4	14
**	sicklepod rockcress - Boechera canadensis	-	T	4	9
**	slender bush-clover - Lespedeza virginica	-	E	3	8
~	slender knotweed - Polygonum tenue	-	E	Historical	5
~	slender muhly - Muhlenbergia tenuiflora	-	E	Historical	3
**	smooth forked whitlow-wort - Paronychia canadensis	-	E	4	9
*	smooth small-leaved tick-trefoil - Desmodium marilandicum)	-	E	1	4
***	Torrey's mountain-mint - Pycnanthemum torrei	-	E	2	3
~	wild chives - Allium schoenoprasum	-	E	Historical	7
~	wild goat's-rue - Tephrosia virginiana	-	E	Historical	7
~	wild lupine - Lupinus perennis ssp. Perennis	-	T	Historical	30
	Vertebrates – Birds				
**	Common Loon - Gavia immer		T	1	339

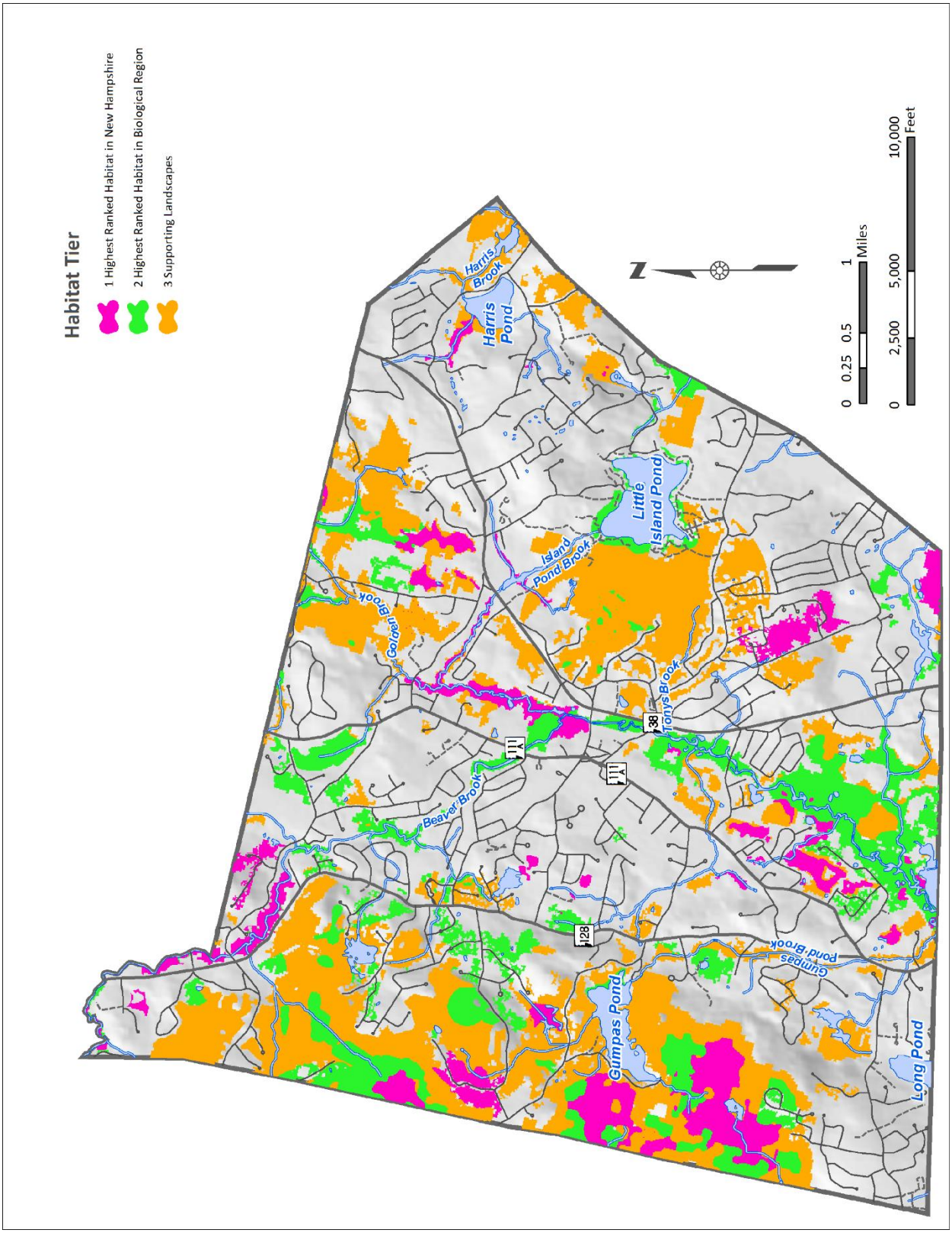
	Vertebrates – Reptiles				
**	Blanding's Turtle - Emydoidea blandingii	-	E	12	1098
**	Eastern Box Turtle - Terrapene Carolina	-	E	1	19
**	Northern Black Racer - Coluber constrictor		T	1	70
**	Spotted Turtle - Clemmys guttata		T	6	165
***	Wood Turtle - Glyptemys insculpta		SC	3	281
	Vertebrates – Fish				
**	American Eel - Anguilla rostrata	-	SC	1	177
~	Banded Sunfish - Enneacanthus obesus	-	SC	Historical	32
**	Redfin Pickerel - Esox americanus	-	E	1	30
	Invertebrates- Mollusks				
***	Brook Floater - Alasmidonta varicose	-	E	1	33
**	Eastern Pond Mussel - Ligumia nasuta		SC	1	8

Listed: E = Endangered T = Threatened
Flags: **** = Highest Importance *** = Extremely High Importance ** = Very high importance
* = High importance ~ = Historical Record SC = Special Concern

Map 7
Habitat Types in Pelham



Map 8
Habitat Tiers



A. Animals

Animal species commonly found in Pelham include raccoons, opossums, skunks, muskrats, beavers, porcupines, woodchucks, white-tailed deer, squirrels, mice, bats, foxes, rabbits, and other indigenous species that are adapted to living near humans and urban activities. Sightings of coyotes, otters, moose, and fisher cats have increased in Pelham as they have in other municipalities. Larger animals that require extensive habitat areas or species that require solitude such as black bears, are rarely sighted in the Town.

B. Birds

Bird species vary according to the season; however, they are also dominated by those species commonly found in southern New Hampshire. Doves, woodpeckers, chickadees, and jays are found throughout the year while warblers, sparrows, hummingbirds, wrens, swallows, robins, and several species of raptors are generally seasonal residents. In addition, there are owls, wild turkeys, woodcocks, spruce grouse, blue herons, pileated woodpeckers, cardinals, bluebirds, and red-tail hawks. Other species such as ducks and geese may nest in the wetlands and ponds and many pass through the Town during spring and fall migrations.

The "Watch List" is a strategy of protecting birds and is the product of many individuals, agencies, and institutions within the Partners in Flight Program to call attention to birds at risk before they require federal listing, stressing preventative action today over last-ditch rescue attempts in the future. Watch List is based on a conservation priority scoring system (database maintained by the Colorado Bird Observatory) which is designed to conserve viable populations of birds and biological systems on which these species depend. The Watch List species are listed in the table below.

Table 8
National Audubon Society's Watch List

Bell's Vireo	Black-throated Blue Warbler	Brown-headed Nuthatch
Canada Warbler	Golden-winged Warbler	Prairie Warbler
Prothonotary Warbler	Hooded Warbler	Rose-breasted Grosbeak
Scarlet Tanager	Summer Tanager	Wood Thrush
Yellow Warbler		

Source: Audubon Society's Watch List, 2021.

Each species on the Watch List receives a priority score of the sum of six criteria:

- Relative abundance
- Breeding distribution
- Nonbreeding distribution
- Conservation threats during breeding season
- Conservation threats during the nonbreeding season (habitat loss and degradation on the breeding and wintering grounds, domestic pets, brood parasitism by cowbirds, collisions with man-made objects, and pesticides)
- Population trend

One of the major causes of loss of bird habitat in New Hampshire is the lack of bottomland farms with open fields, hedgerows, grasslands, and the cutting of hayfields during nesting season. By 1850, at the height of agricultural development in New Hampshire, only 20% was forest, while the remaining 80% of Hillsborough County was cleared for livestock grazing, growing livestock feed, and other crops for home consumption. The agricultural properties were the first to be developed because of the topography, limited clearing/site preparation and soil compatibility for septic systems. Grassland birds such as bobolink, barn swallows, brown thrashers, meadowlarks, and field sparrows are on the decline with the loss of fields. The Conservation Commission is actively working to conserve field habitat. A 16-acre field is currently protected at the Merriam Farm site, a 4-acre field at Cutter Woods, and a 1-acre field is conserved at Wolven Park. The Commission continues to seek opportunities to conserve open field habitat areas.

Increased development reduces the supply of natural cavities that bluebirds and other cavity nesters use to rear their young. Alien species from Europe like the house sparrow and starlings also compete for what few nesting cavities there are available. It is recommended to leave at least two standing dead trees or "snags" per acre. Mammals such as chipmunks, opossum, raccoons, etc. also use cavity trees, so larger numbers of snags benefit their populations as well.

C. Plants

Plant species in Pelham are again dominated by those species commonly found in southern New Plants

Mountain Laurel

Plant species in Pelham are dominated by those species commonly found throughout southern Hampshire. The NH Natural Heritage Inventory (NHI) records indicate the presence of forty-six threatened, endangered or species of concern plant species in Town. Among the most noteworthy of the Town's important natural communities is the unique collection of plant species found in the vicinity of Jeremy Hill. The unusually high number of plant species listed in Pelham is an indication of the uniqueness and importance of the Town's natural areas.

In addition, the New Hampshire Native Plant Protection Act identifies eleven plants as "special concern." These species are not rare in New Hampshire, but their showy nature makes them vulnerable to over collection. The table identifies the species of special concern, many of which are found in Pelham.

Table 9
New Hampshire Plant Species of Special Concern

Trailing arbutus	Grass pink	White fringe orchids
Mountain laurel	Flowering dogwood	Large purple fringed orchid
Pitcher Plant	Pink lady's slipper	Rose pogonia
Lapland rosebay	Dutchman's breeches	

Source: NH Natural Heritage Inventory.

Another type of "species of concern," are invasive plants that are not native to New Hampshire. Plants, seeds, or cuttings were imported by immigrants, the nursery trades, ship ballast, and the former Soil Conservation Service for erosion control. Invasive plants share common characteristics that allow them to thrive. Most plants produce great quantities of seed or have a very aggressive root system. These plants are able to establish in almost any environment including disturbed areas. Invasive plants dominate even healthy natural areas and disrupt natural succession. The invasive plant species found in New Hampshire are listed in the table below. The NH Invasive Species Committee has also created an "Invasive Plant Species Watch List" of plants that may pose a threat as invasives in the near future. That list is shown in Table 11.

Table 10
Prohibited Invasive Plants in New Hampshire

Scientific name	Synonyms	Common name
***Acer platanoides* L.**	*Acer platanoides* var. *schwedleri* Nichols.	**Norway maple**
***Ailanthus altissima* (P. Mill.) Swingle**	*Ailanthus glandulosa* Desv.	**Tree of heaven**
***Alliaria petiolata* (Bieb.) Cavara & Grande**	*Alliaria alliaria* (L.) Britt.; *Alliaria officinalis* Andrz. *ex* Bieb.; *Erysimum alliaria* L.; *Sisymbrium alliaria* (L.) Scop.	**Garlic mustard**
***Alnus glutinosa* (L.) Gaertn.**	*Alnus* (L.) Britt.; *Betula alnus* L. var. *glutinosa* L.	**European black alder**
***Berberis thunbergii* DC.**		**Japanese barberry**
***Berberis vulgaris* L.**		**European barberry**
***Celastrus orbiculatus* Thunb.**		**Oriental bittersweet**
***Centaurea stoebe* L. ssp. *micranthos* (Gugler) Hayek**	*Centaurea biebersteinii* DC.; *Centaurea maculosa* Lam., misapplied; *Centaurea maculosa* Lam. ssp. *micranthos* Gugler	**Spotted knapweed**
***Cynanchum louiseae* Kartesz & Gandhi**	*Cynanchum nigrum* (L.) Pers.; *Vincetoxicum nigrum* (L.) Pers.	**Black swallow-wort**
***Cynanchum rossicum* (Kleopow) Borhidi**	*Cynanchum medium*, of authors not R. Br.; *Vincetoxicum medium*, of authors not (R. Br.) Dcne.; *Vincetoxicum rossicum* (Kleopow) Barbarich	**Pale swallow-wort**
***Elaeagnus umbellata* Thunb. var. *parvifolia* (Royle) Schneid.**	*Elaeagnus parvifolia* Royle	**Autumn olive**
***Euonymus alatus* (Thunb.) Sieb.**	*Celastrus alatus* Thunb.	**Burning bush**

***Frangula alnus* P. Mill.**	*Rhamnus frangula* L.	**Glossy buckthorn**
***Glyceria maxima* (Hartman) Holmb.**	*Glyceria spectabilis* Mert. & Koch; *Molinia maxima* Hartman	**Reed sweet grass**
***Heracleum mantegazzianum* Sommier & Levier**		**Giant hogweed**
Hesperis matronalis		**Dames rocket**

Source: https://www.agriculture.nh.gov/publications-forms/documents/prohibited-invasive-species.pdf **(2017)**

Table 11
New Hampshire Invasive Plant Species Watch List

Scientific Name	Synonyms	Common Name
***Abutilon theophrasti* Medik.**		Velvetleaf Indian-mallow
***Acer ginnala* Maxim.**		Amur maple
Agrostemma githago* L. var. *githago	*Lychnis githago* (L.) Scop.	Common corncockle
***Aira caryophyllea* L.**	*Aspris caryophyllea* (L.) Nash	Common silver-hairgrass
***Allium vineale* L.**		Crow garlic
***Amorpha fruticosa* L.**	*Amorpha fruticosa* L. var. *angustifolia* Pursh; *A. fruticosa* L. var. *oblongifolia* Palmer; *A. fruticosa* L. var. *tennesseensis* (Shuttlw. *ex* Kunze) Palmer	False indigo-bush
***Aralia elata* (Miq.) Seem.**	*Dimorphanthus elatus* Miq.	Japanese angelica-tree
***Barbarea vulgaris* Ait. f.**	*Barbarea arcuata* (Opiz *ex* J. & K. Presl) Reichenb.; *B. stricta*, of authors not Andrz.; *B. vulgaris* var. *arcuata* (Opiz *ex* J. & K. Presl) Fries; *Campe barbarea* (L.) W. Wight *ex* Piper; *C. stricta*, of authors not (Andrz.) W. Wight *ex* Piper; *Erysimum barbarea* L.	Garden yellow-rocket
***Brassica juncea* (L.) Czern.**	*Brassica juncea* (L.) Czern. var. *crispifolia* Bailey; *Sinapis juncea* L.	Chinese mustard
***Brassica nigra* (L.) W.D.J. Koch**	*Sinapis nigra* L.	Black mustard
***Bromus tectorum* L.**	*Anisantha tectorum* (L.) Nevski	Cheat brome
***Cardamine impatiens* L.**		Narrow-leaved bitter-cress
***Centaurea jacea* L.**	*Centaurea debeauxii* Gren. & Godr. ssp. *thuillieri* Dostál; *C. jacea* L. ssp. *decipiens* (Thuill.) Čelak.; *C. jacea* L. ssp. *pratensis* Čelak.; *C. pratensis* Thuill.; *C. thuillieri* (Dostál) J. Duvign. & Lambinon; *Cyanus jacea* (L.) P. Gaertn.; *Jacea pratensis* Lam.	Brown knapweed

***Centaurea nigra* L.**	*Jacea nigra* (L.) Hill	Black knapweed
***Chelidonium majus* L.**	*Chelidonium majus* L. var. *laciniatum* (P. Mill.) Syme; *C. majus* L. var. *plenum* Wehrhahn	Greater celandine
***Cirsium palustre* (L.) Scop.**	*Carduus palustris* L.	Marsh thistle
***Cirsium vulgare* (Savi) Ten.**	*Carduus lanceolatus* L.; *C. vulgaris* Savi; *Cirsium lanceolatum* (L.) Scop.	Common thistle
***Convolvulus arvensis* L.**	*Strophocaulos arvensis* (L.) Small	Field bindweed
***Cytisus scoparius* (L.) Link**	*Spartium scoparium* L.	Scotch broom
***Digitaria sanguinalis* (L.) Scop.**	*Panicum sanguinale* L.	Hairy crabgrass
***Eichhornia crassipes* (Mart.) Solms-Laubach**	*Eichhornia speciosa* Kunth; *Piaropus crassipes* (Mart.) Raf.	Common water-hyacinth
***Elymus repens* (L.) Gould**	*Agropyron repens* (L.) Gould; *Elytrigia repens* (L.) Desv. *ex* B.D. Jackson; *Triticum repens* L.	Creeping wild-rye
***Epilobium hirsutum* L.**		Hairy willow-herb
***Epipactis helleborine* (L.) Crantz**	*Epipactis latifolia* (L.) All.; *Serapias helleborine* L.	Broad-leaved helleborine
***Euonymus europaeus* L.**		European spindle-tree
***Euonymus fortunei* (Turcz.) Hand.-Mazz**	*Euonymus fortunei* (Turcz.) Hand.-Mazz var. *radicans* (Sieb. *ex* Miq.) Rehd.; *E. fortunei* (Turcz.) Hand.-Mazz var. *vegetus* (Rehd.) Rehd.; *E. radicans* Sieb. *ex* Miq.; *E. radicans* Sieb. *ex* Miq. var. *vegetus* Rehd.	Climbing spindle-tree
***Festuca filiformis* Pourret**	*Festuca capillata* Lam.; *F. ovina* L. var. *capillata* (Lam.) Alef.; *F. tenuifolia* Sibthorp	Fine-leaved sheep fescue
***Ficaria verna* Huds. ssp. *fertilis* (Lawralrée *ex* Laegaard) Stace**	*Ficaria verna* Huds. ssp. *bulbifera* A. & D. Löve; *Ranunculus ficaria* L. ssp. *bulbilifer* Lambinon; *R. ficaria* L. ssp. *bulbifera* (Marsden-Jones) Lawalree, an illegitimate name; *R. ficaria* var. *bulbifera* Marsden-Jones	Fig-crowfoot
***Froelichia gracilis* (Hook.) Moq.**	*Oplotheca gracilis* Moq.	Slender cotton-weed
***Galium mollugo* L.**		Whorled bedstraw
***Glechoma hederacea* L.**	*Glechoma hederacea* L. var. *micrantha* Moric.; *G. hederacea* L. var. *parviflora* (Benth.) House; *Nepeta hederacea* (L.) Trevisan	Gill-over-the-ground
***Hylotelephium telephium* (L.) H. Ohba**	*Sedum purpureum* (L.) J.A. Schultes; *S. purpurascens* W.D.J. Koch; *S. telephium* L.	Purple orpine

***Kochia scoparia* (L.) Schrad.**	*Bassia scoparia* (L.) A.J. Scott; *Chenopodium scoparium* L.; *Kochia scoparia* (L.) Schrad. var. *pubescens* Fenzl; *K. scoparia* (L.) Schrad. var. *subvillosa* Moq.	Summer-cypress
Lamium amplexicaule* L. var. *amplexicaule		Common henbit
***Lamium purpureum* L.**	*Lamium dissectum* With.; *L. hybridum*, of authors not Vill.	Red henbit
***Lonicera xylosteum* L.**		Fly honeysuckle
Lupinus polyphyllus* Lindl. var. *polyphyllus	*Lupinus pallidipes* Heller; *L. polyphyllus* Lindl. var. *albiflorus* L.H. Bailey; *L. polyphyllus* Lindl. var. *pallidipes* (Heller) C.P. Sm.	Blue lupine
Lychnis flos-cuculi* L. ssp. *flos-cuculi	*Coronaria flos-cuculi* (L.) A. Braun; *Silene flos-cuculi* (L.) Clairville	Ragged robin lychnis
***Lysimachia arvensis* (L.) U. Manns & A. Anderb.**	*Anagallis arvensis* L.; *A. arvensis* L. var. *caerulea* (Schreb.) Gren. & Godr.; *A. caerulea* Schreb.	Scarlet pimpernel
***Lysimachia vulgaris* L.**		Garden yellow-loosestrife
***Miscanthus sinensis* Anderss.**	*Miscanthus sinensis* Anderss. var. *gracillimus* A.S. Hitchc.	Chinese silvergrass
***Mycelis muralis* (L.) Dumort.**	*Lactuca muralis* (L.) Fresen.	Wall-lettuce
***Myosotis scorpioides* L.**	*Myosotis palustris* (L.) Hill	Water forget-me-not
***Nasturtium microphyllum* Boenn. *ex* Reichenb.**	*Nasturtium officinale* Ait. f. var. *microphyllum* (Boenn. *ex* Reichenb.) Thellung; *Rorippa microphylla* (Boenn. *ex* Reichenb.) Hyl. *ex* A. & D. Löve	One-rowed water-cress
***Nasturtium officinale* Ait. f.**	*Baeumerta nasturtium-aquaticum* (L.) Hayek; *Rorippa nasturtium aquaticum* (L.) Hayek; *Sisymbrium nasturtium-aquaticum* L.	Two-rowed water-cress
***Oenanthe javanica* (Blume) DC**		Java water dropwort
***Persicaria longiseta* (Bruijn) Kitagawa**	*Persicaria caespitosa* (Blume) Nakai var. *longiseta* (Bruijn) Reed; *Polygonum caespitosum* Blume var. *longisetum* (Bruijn) Steward; *P. longisetum* Bruijn	Oriental lady's-thumb smartweed
***Phellodendron amurense* Rupr.**	*Phellodendron amurense* Rupr. var. *sachalinense* F. Schmidt; *P. japonicum* Maxim.; *P. sachalinense* (F. Schmidt) Sarg.	Amur corktree
***Poa compressa* L.**		Flat-stemmed blue grass
***Poa nemoralis* L.**		Wood blue grass
***Populus alba* L.**	*Populus alba* L. var. *bolleana* Lauche	White poplar

***Ranunculus repens* L.**	*Ranunculus repens* L. var. *degenerates* Schur; *R. repens* L. var. *erectus* DC.; *R. repens* L. var. *glabratus* DC.; *R. repens* L. var. *pleniflorus* Fern.; *R. repens* L. var. *villosus* Lamotte	Spot-leaved crowfoot
Raphanus raphanistrum* L. ssp. *raphanistrum		Wild radish
Rhinanthus minor* L. ssp. *minor	*Rhinanthus crista-galli* L., in part; *R. crista-galli* L. var. *fallax* (Wimmer & Grab.) Druce; *R. stenophyllus* (Schur) Schinz & Thellung	Little yellow-rattle
***Rumex acetosella* L. ssp. *pyrenaicus* (Pourret *ex* Lapeyr.) Akeroyd**	*Acetosella vulgaris* (Koch) Fourr. ssp. *pyrenaica* (Pourret *ex* Lapeyr.) Á. Löve; *Rumex acetosella* L. var. *pyrenaicus* (Pourret *ex* Lapeyr.) Timbal-Lagrave; *R. pyrenaicus* Pourret *ex* Lapeyr.	Sheep dock
***Securigera varia* (L.) Lassen**	*Coronilla varia* L.	Purple crown-vetch
***Silphium perfoliatum* L.**		Cup-plant rosinweed
***Sinapis arvensis* L.**	*Brassica arvensis* Rabenh.; *B. kaber* (DC.) L.C. Wheeler; *B. kaber* (DC.) L.C. Wheeler var. *pinnatifida* (Stokes) L.C. Wheeler	Corn charlock
Solanum carolinense* L. var. *carolinense		Carolina nightshade
***Solanum dulcamara* L.**		Climbing nightshade
***Sonchus arvensis* L.**	*Sonchus arvensis* L. ssp. *uliginosus* (Bieb.) Nyman; *S. uliginosus* Bieb.	Field sow-thistle
***Sorbaria sorbifolia* (L.) A. Braun**	*Schizonotus sorbifolius* (L.) Lindl.; *Spiraea sorbifolia* L.	False spiraea
***Tanacetum vulgare* L.**	*Chrysanthemum uliginosum* Pers.; *C. vulgare* (L.) Bernh.	Common tansy
***Tussilago farfara* L.**		Coltsfoot
***Typha ×glauca* Godr.**		Hybrid cattail
***Valeriana officinalis* L.**		Common valerian
***Vinca minor* L.**		Lesser periwinkle

Source: *https://extension.unh.edu/resource/invasive-plants* (2018)

D. Aquatic Habitat

In addition to the highly visible species, habitats for other less visible species such as turtles, frogs, toads, salamanders, snakes, and numerous insects are present in the Town. The NHI lists the Blanding's turtle, eastern box turtle, banded sunfish, and two species of mollusks (invertebrates) as threatened or endangered in New Hampshire.

Forested riparian buffers benefit aquatic habitat by improving the quality of nearby waters through shading, filtering, and moderating stream flow. Shade in summer maintains cooler, more even temperatures, especially on small streams. Cooler water holds more oxygen and reduces stress on fish and other aquatic creatures. Some small streams in Pelham are known to have populations of wild brook trout, which are especially sensitive to siltation and increased water temperatures caused by the removal of streamside vegetation. In addition, Beaver Brook is stocked with trout by the State.

In small well-shaded streams, the leaves, limbs, fruit, and insects that fall into the stream are an important energy source for the aquatic food chain. The detritus is broken down by invertebrates, fungi, and bacteria and are in turn eaten by benthic macro invertebrates and eventually fish. The woody debris that falls also creates stepped pools, providing cover for fish and their food supply (benthic macro invertebrates) while reducing erosion by slowing the flow of the stream.

VIII. FOREST RESOURCES

Forest types are distinctive communities of trees and are named for the predominant tree species occurring in that type. Common forest types in Pelham include white pine, northern hardwood, and red oak. South central New Hampshire receives approximately forty-three inches of precipitation per year. Most of this precipitation is evenly distributed throughout the year, though there can be occasional droughts in the summer. As climate change intensifies it is likely that precipitation will be more concentrated in large rain events and will be less evenly distributed throughout the year than in the past.

Climate, elevation, soil conditions, and land use history all play a role in determining which forest type exists in a particular area. On abandoned agricultural sites, any open field left unattended will eventually revert to pine and/or oak type.

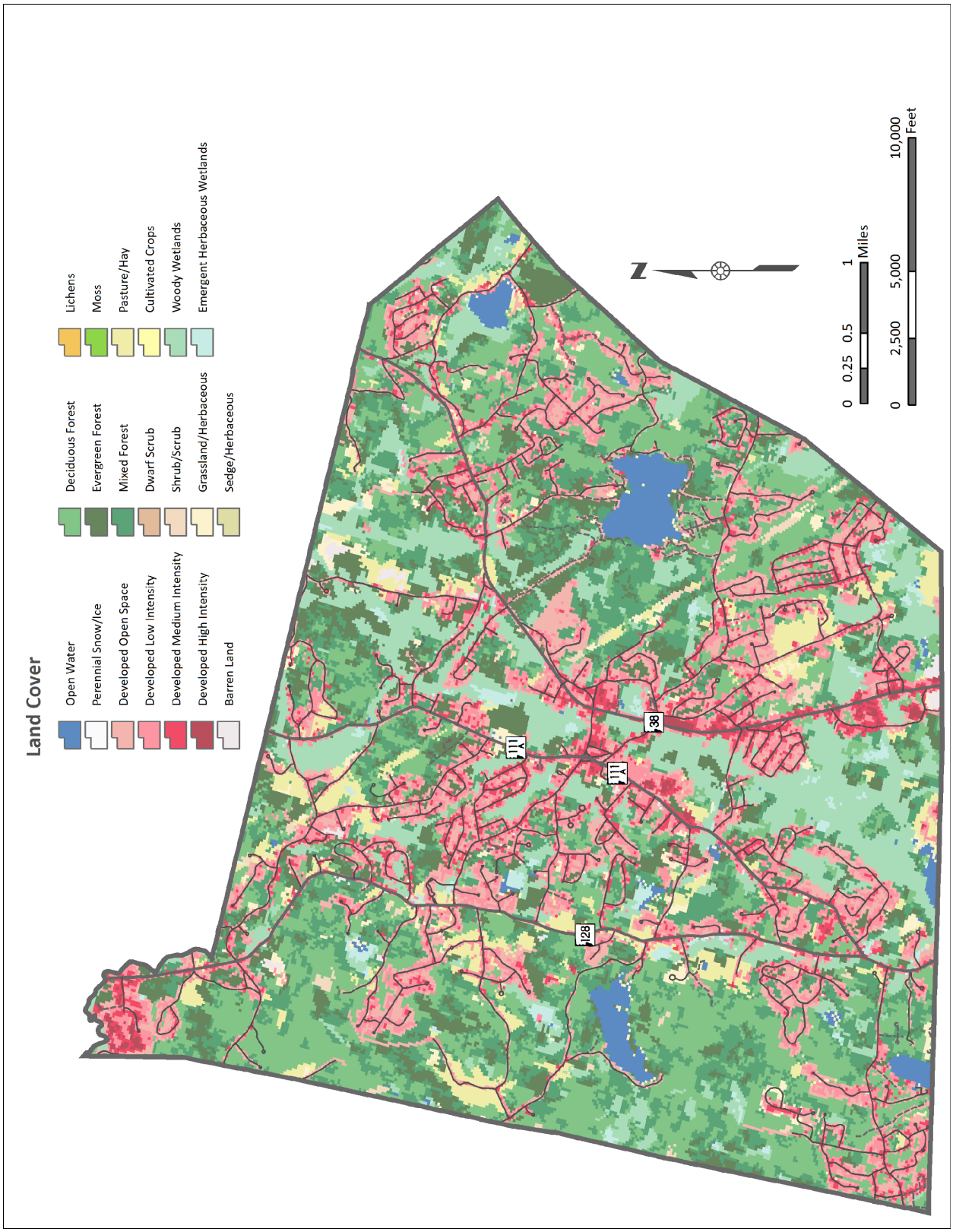
A forest type may be dominated by a single tree species, or it may be dominated by several species growing together. White pine often occurs as a pure species type. Northern hardwood, which is composed of sugar maple, beech, yellow birch, red maple, white ash, and smaller amounts of other species, is a multiple species type.

Continued development of Pelham and the surrounding region has increased the acreage cleared for housing and businesses. There is a clear loss of forested land to more urban/suburban development which is illustrated below in Map 9: Change in Land Cover 2001-2016. The loss of forested land can have many effects on the environment, making it important to strategize lands to preserve. Pelham has done considerable work in the past two decades to preserve major acreage as forested land providing large blocks of unfragmented habitat and areas for diverse forests to be maintained.

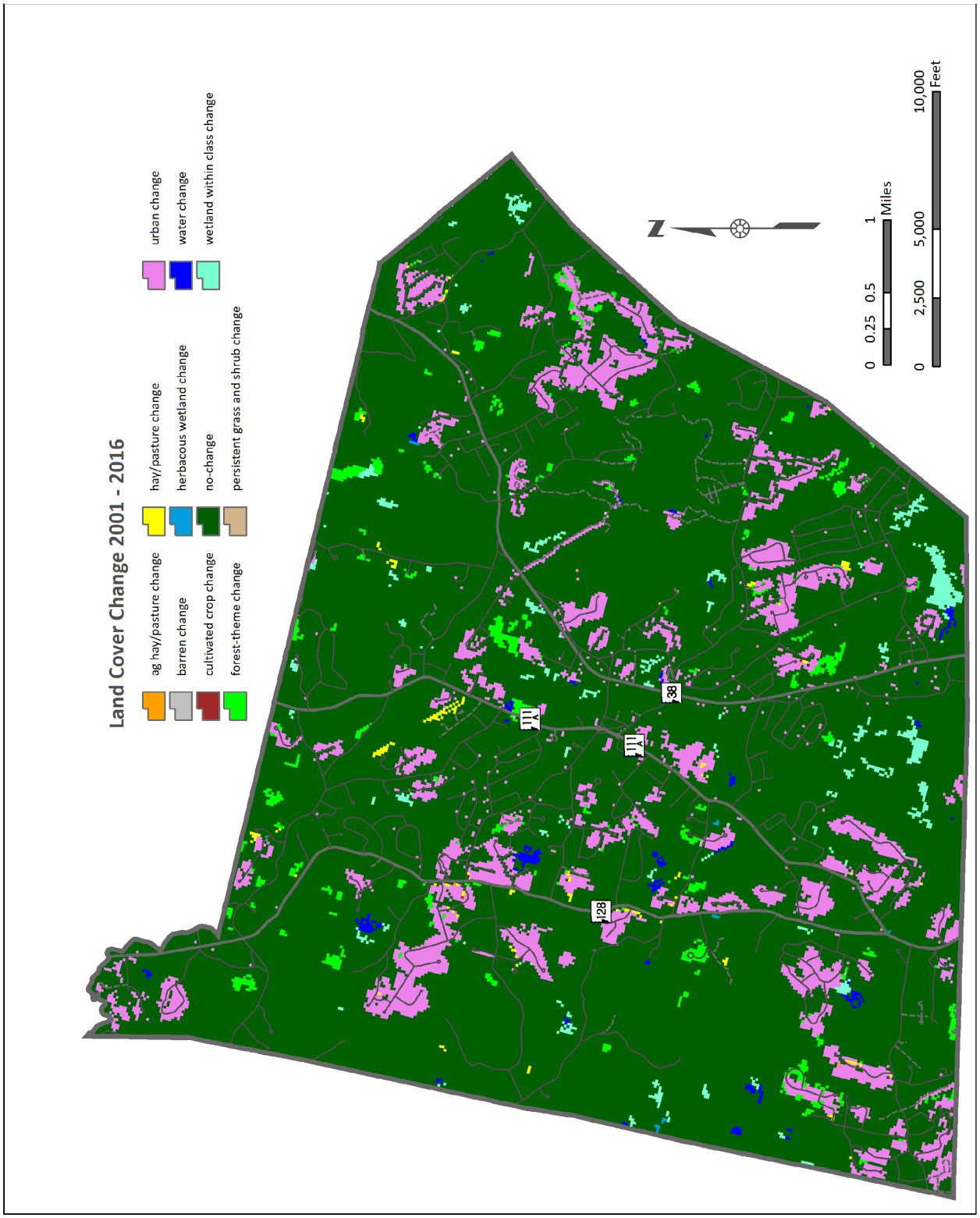
A forest block is an intact area of forest canopy without regard to ownership that is typically defined by travelled roadways, large water bodies, and non-forest land uses[9]. According to the Society for the Protection of New Hampshire Forests' (SPNHF) 2010 publication, *Population Growth and Land Use Change in the Granite State*, "[a] 500-acre forest block can provide adequate habitat for many species, help protect water quality, allow for sustainable forest management, and offer opportunities for outdoor recreation." SPNHF also notes that "[a] 5,000-acre block represents a minimum size for sustainable forest management at regional scale, as well as a framework that supports long-term ecological functions and processes." However, due to the extent of development in the region, conserving an area of this size is not feasible in Pelham.

[9] Population Growth and Land Use Change in the Granite State, SPNHF 2010

Map 9
Pelham Land Cover



Map 10
Land Cover Change 2001-2016



The following principles are adapted from the Northern Forest Lands Council Principles of Sustainability and the Society of American Foresters Task Force *Report on Sustaining Long-Term Forest Health and Productivity*. Both sets of principles are interrelated and are equally as important.

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

- Maintenance of soil productivity
- Conservation of water quality, wetlands, vernal pools, and riparian zones
- Maintenance or creation of a healthy balance of forest size classes
- Conservation and enhancement of habitats that support a full range of native flora and fauna
- Protection of unique or fragile natural areas

Meet the diverse needs of human community, through:

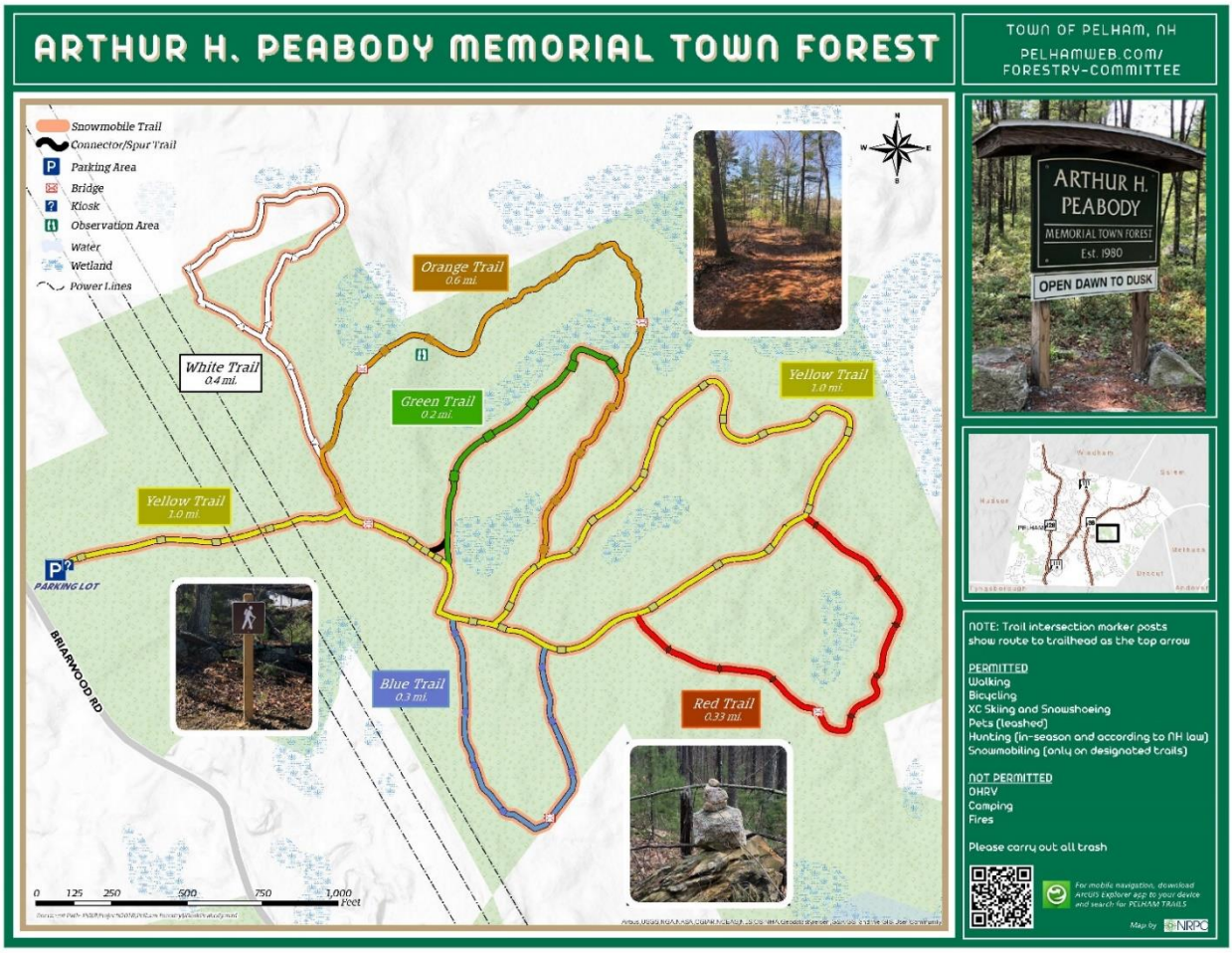
- Continuous flow of timber, pulpwood, and other forest products
- Improvement of the overall quality of the timber resource as a foundation for more value added opportunities
- Addressing the aesthetic impacts of forest harvesting
- Continuation of opportunities for traditional recreation

A. Pelham's Town Forests

Pelham has numerous designated town forests totaling approximately 2,161 acres that are scattered throughout the community. All town forests are managed by the Pelham Forestry Committee. Each site has a Forest Management Plan prepared by a professional forester. In addition, Pelham has adopted a Climate Adaptation Forest Management Plan and conducts regular resiliency assessments of its sites. The forestry program in Pelham adheres to the principals of sustainability described above. Forestry is considered not strictly from a timber dollar point of view but by a multiple approach that good forestry is good economic practice. The main goal of the plan is to promote forest health, protect sensitive areas and improve wildlife habitat and recreational opportunities. Areas with numerous vernal pools and wetlands that do have outflows are left alone. Buffers of trees are left to maintain shade and to allow transient wetland species to be able to complete their life cycles during seasonal pooling of winter runoff.

Silviculture methods of harvesting have been predominately biomass, conventional, and tree stand improvement (TSI). TSI usually involves girdling or felling low quality trees with a chainsaw and leaving them on the forest floor to reduce the basal area and improve the spacing between the crowns (canopy) of trees. The decaying trees also provide valuable nutrients for the remaining crop trees.

Plans are reviewed and updated every 5-10 years, on an as-needed basis, or because of changes due to damage from wildfires or insect infestation. A public workshop is presented each time a management plan is revised, or harvests planned.



Peabody Town Forest (155 acres) – Briarwood Road

The 2009 Forest Management Plan delineates eleven different stands of trees, made up of primarily white pine (67%), red oak (20%), and black oak (8%). In total 1,495,950 boardfeet or 1,238 cords was estimated from accessible stands. In 1996, a conventional harvest yielded 116 M boardfeet pine and 16 M oak. Two years later a conventional harvest yielded 108 M boardfeet of pine and 9 M oak. In 1999, a biomass harvest produced 169 M boardfeet pine, 10 M oak and 1,483 tons wood chips. The most recent harvests were conducted in 2010 on the southern section bringing in $17,249 in revenue and on the northern section in 2011 which brought in $35,386 in revenue. The next management plan updates are planned for 2024 and 2025. These harvests provided good thinning and pine regeneration. A powerline on the property is cleared of tree species allowing for low growing brush species to grow providing valuable food for wildlife. The forest contains 76 acres of wetlands and vernal pools. The Peabody Town Forest has almost four miles of multi-use trails.

Blueberry Circle Woodlot (20 acres) – Blueberry Circle

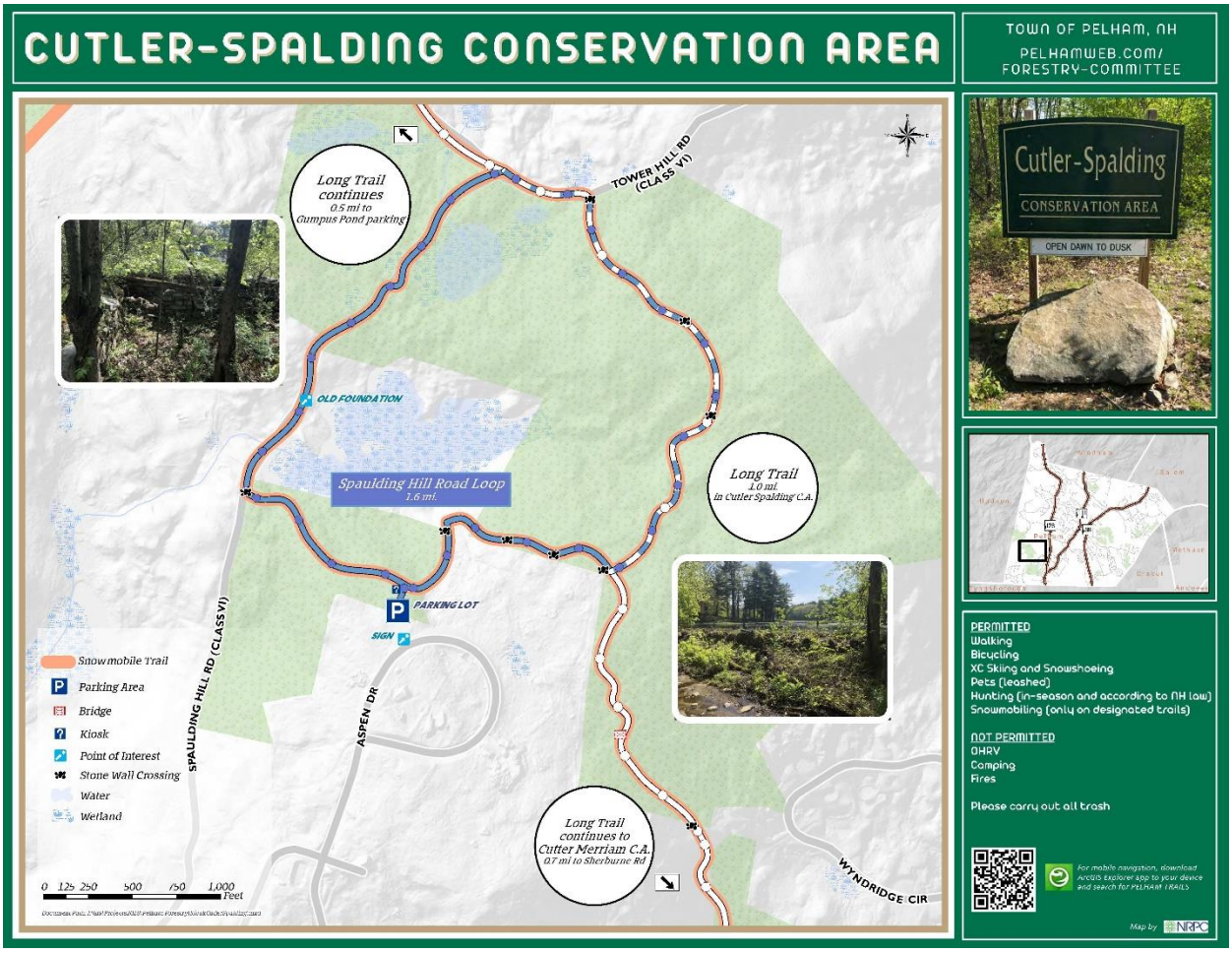
The Blueberry Circle lot was designated as a town forest in 1992. The 2012 management plan identified one stand of trees primarily white pine (61%) and red oak (19%). In total 135,908 boardfeet or 124 cords were estimated to be within the stand. In 1997-98, a harvest yielded 123 M boardfeet of pine. The most recent harvest was conducted in 2014 which yielded $9,819 in revenue. The management plan is scheduled to be updated in 2028 and a harvest is planned for 2029. Vernal pools are scattered throughout the property providing valuable wildlife habitat. The property is primarily used by surrounding residents for hiking and biking.

Costa Conservation Area (131 acres) –Frontier Drive

Costa Conservation Area was designated as a town forest in 2006. The 2009 management plan identified eight separate stands of trees mostly comprised of white pine (43%), red oak (35%), and black oak (12%). In total 795,774 boardfeet or 1,737 cords is estimated within the stands. A timber harvest was conducted in 2013 that brought in $29,555 in revenue. The management plan is scheduled to be updated in 2027 and the next harvest is planned for 2028. The Costa property benefits from a diversity of forest types and varied terrain which enhances its value for wildlife habitat. The site includes a large forest wetland area at its southern end and a powerline easement across the western end of the site. The property includes almost two miles of trails.

Cutler Spalding Conservation Area and Wyndridge Circle Parcels (175 acres) - Gumpas Hill Road

The Cutler Spalding Conservation Area was designated as a town forest in 2012 with an additional area designated in 2019. The 2017 management plan identified five stands of trees mostly comprised of white pine (46%), red oak (30%), and black oak (14%). In total 1,303,610 boardfeet or 1,465 cords were estimated to be within the stands. A harvest was conducted in 2019 that resulted in $48,812 in revenue. The plan is scheduled to be updated in 2033 and a harvest is planned for 2034. The property is largely forested but does include two large wetlands in the northwestern portion. A fire sparked by target shooting in 2021 caused significant damage to the property, burning through approximately 35-acres of forest land. There are several stone walls located throughout the site that indicate a history of agricultural use. Recreational trails exist on the property which connect to neighboring conservation areas, Gumpas Pond to the north and Merriam Cutler to the south, creating a contiguous 500 acres of open space.



Cutler Spauling Town Forest

Cutter Merriam Land (181 Acres) – Sherburne Road

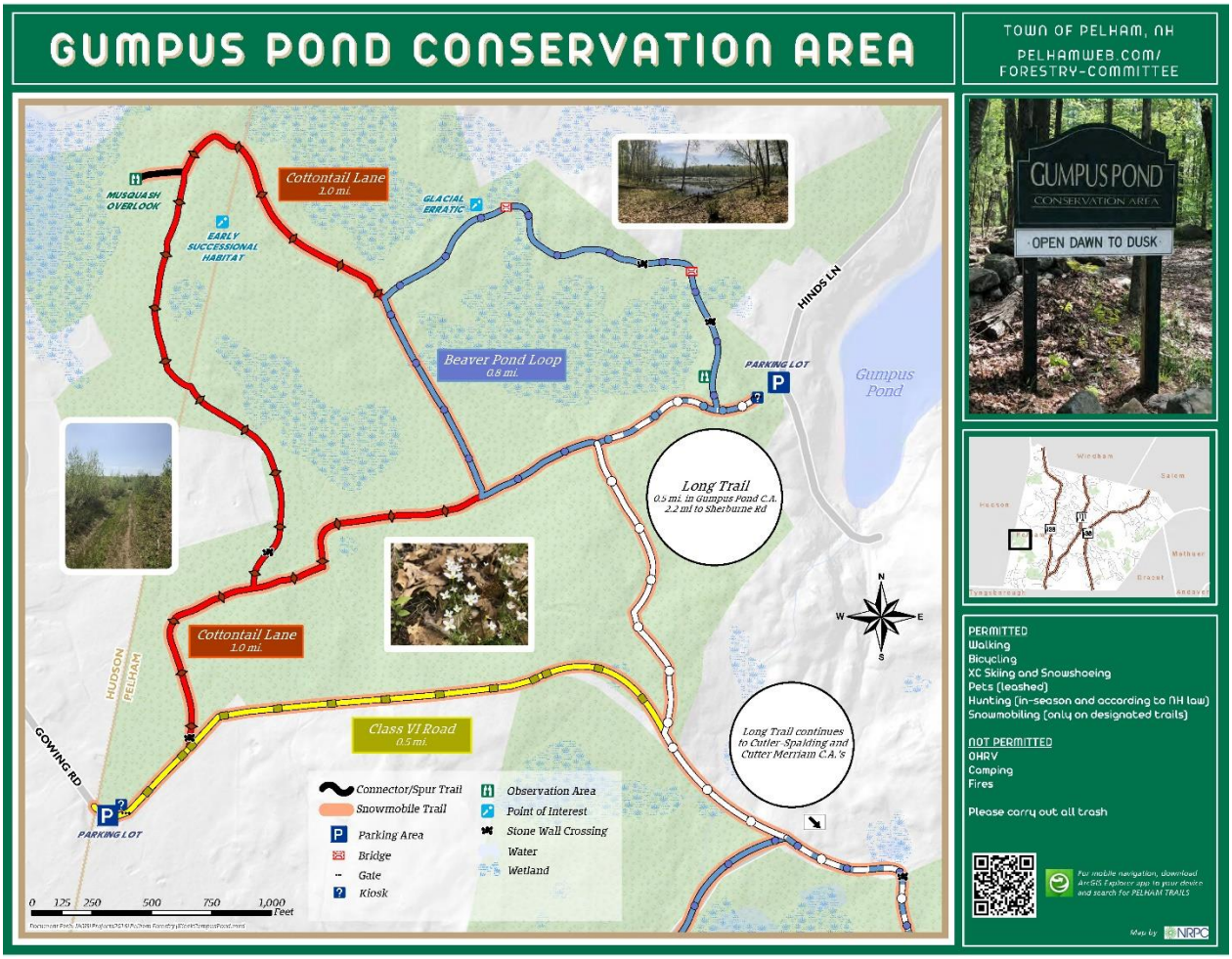
The Cutter Merriam Land consists of multiple parcels that were designated as town forests in 2006. The 2007 management plan identified fifteen separate stands of trees mostly comprised of white pine (58%), red oak (26%), and black oak (9%). In total 1,489,008 boardfeet or 1,194 cords is estimated within the stands. A timber harvest was conducted on the Cutter Woods & Charles Jack parcels in 2008 that yielded $14,796 in revenue. The Merriam parcel has not been harvested to date, but a harvest is planned for 2022. Timber harvests are planned on the Cutter Woods & Charles Jack parcels in 2025. Like many forested areas in Pelham, the property was once used for farming and is largely surrounded by stonewalls. The Cutter Merriam property is considered to be one of the most important town forests in Pelham. The property provides important habitat areas for wildlife including two small open fields and extensive beaver activity. With approximately 3 miles of trails, the property is also an important recreational resource. Long Trail, which includes a .5-mile section on the site, continues for another 1.7 miles to Gumpas Pond.

Doreen Drive Woodlot (24 acres) – Doreen Drive

The Doreen Drive property was designated as a town forest in 1992. The 2009 management plan identified fifteen separate stands of trees mostly comprised of red oak (40%), white pine (34%), and black oak (19%). In total 228,718 boardfeet or 188 cords is estimated within the stands. A timber harvest was conducted in 2014 that yielded $20,738 in revenue. An update to the management plan is scheduled for 2028 with the next harvest planned for 2029.

Elmer G. Raymond Park (241 acres) - Keyes Hill Road/Rt. 128

Raymond Park was designated as a Town Forest in 1992. The 2010 Forest Management Plan identified ten different stands of trees in the park. In total 1,413,442 boardfeet was estimated from accessible stands, and 1,437 Cords. 1995 biomass harvest realized 42 M boardfeet pine, 5 M oak and 672 tons of chips. The 1996-97 biomass harvest was 60M boardfeet pine, 5M oak and 1,078 tons of chips. In addition, one conventional harvest was completed for 67 M boardfeet of pine. Additional last harvests were conducted in 2012 and 2014 bringing in $34,914 and $34,462 in revenue respectively. The abandoned Hudson, Pelham & Salem Electric Railroad grade runs the entire width of the property and is used by a variety of recreational enthusiasts. A natural gas line runs north to south through the property allowing for a wildlife corridor. The small wetlands have exhibited substantial wildlife activity. The Park includes approximately 3.7 miles of trails.



Gumpas Pond (185 acres) – Hinds Lane

The Gumpas Pond property includes approximately 153 acres in Pelham and another 31 acres in Hudson. It was designated as a town forest in 2014. The 2005 management plan identified thirteen separate stands of trees mostly comprised of red oak (34%), black oak (30%), and white pine (18%). In total 1,489,008 boardfeet or 1,194 cords is estimated within the stands. A timber harvest conducted in 2008 generated $54,189 in revenue. The management plan is scheduled to be updated in 2025 and the next harvest is planned for 2026.

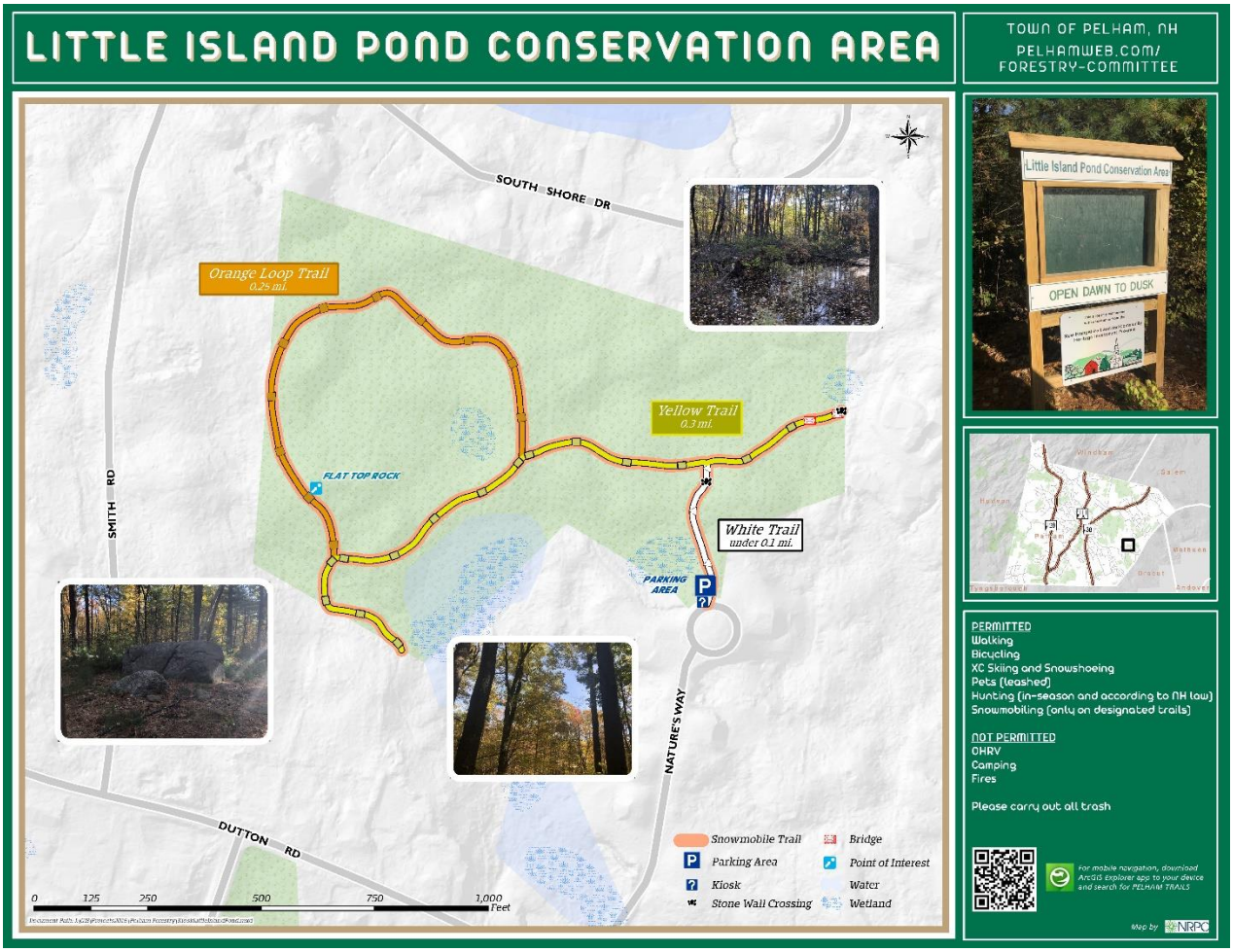
Considered a part of the larger Musquash Swamp system of wetlands that stretch from the Merrill Hill area in Hudson to Gumpas Pond, the property has enormous value for wildlife due to its wide variety of forest types, various stages of regrowth, variable terrain, and the presence of flowing and standing water. These factors all help support a diverse range of flora and fauna by providing critical areas of food, water, cover, and breeding habitat. Importantly, most of these habitat areas are also interconnected. In addition to its wildlife habitat value, the Gumpas Pond Conservation area also has important recreational value. The property supports over three miles of trails. In addition, the 2.2-mile Long Trails connects the site to the Cutter Merriam Conservation Area described above.

Kirby/Ivers Town Forest (85 acres) - Route 111A

The Kirby-Ivers site was designated as a town forest in 2012. Four tree stands are identified in the 2014 management plan. The stands are comprised primarily of white pine (49%), and red oak (43%). In total, 310,075 boardfeet or 302 cords was estimated from accessible stands. A harvest was conducted in 2016

which resulted in $46,412 in revenue. The management plan is scheduled to be updated in 2030 with the next harvest planned for 2031. The property has a small parking area constructed shortly after the purchase of the western parcel. Recreational activities include snowmobiling, mountain biking and hiking. Scattered wetlands support a variety of wildlife.

Scenes from Kirby-Ivers Town Forest



Little Island Pond Conservation Area (21 acres) – Nature's Way
Little Island Pond Conservation Area was purchased by the town through the use of state LCHIP funds and designated as a town forest in 2006. The management plan prepared in 2005 identified fifteen separate stands of trees mostly comprised of white pine (64%), red oak (11%), and black oak (11%). In total 287,677,947 boardfeet or 228 cords is estimated within the stands. A timber harvest was conducted in 2009 which generated $14,496 in revenue. The management plan is scheduled to be updated in 2025 with a harvest planned for 2026.

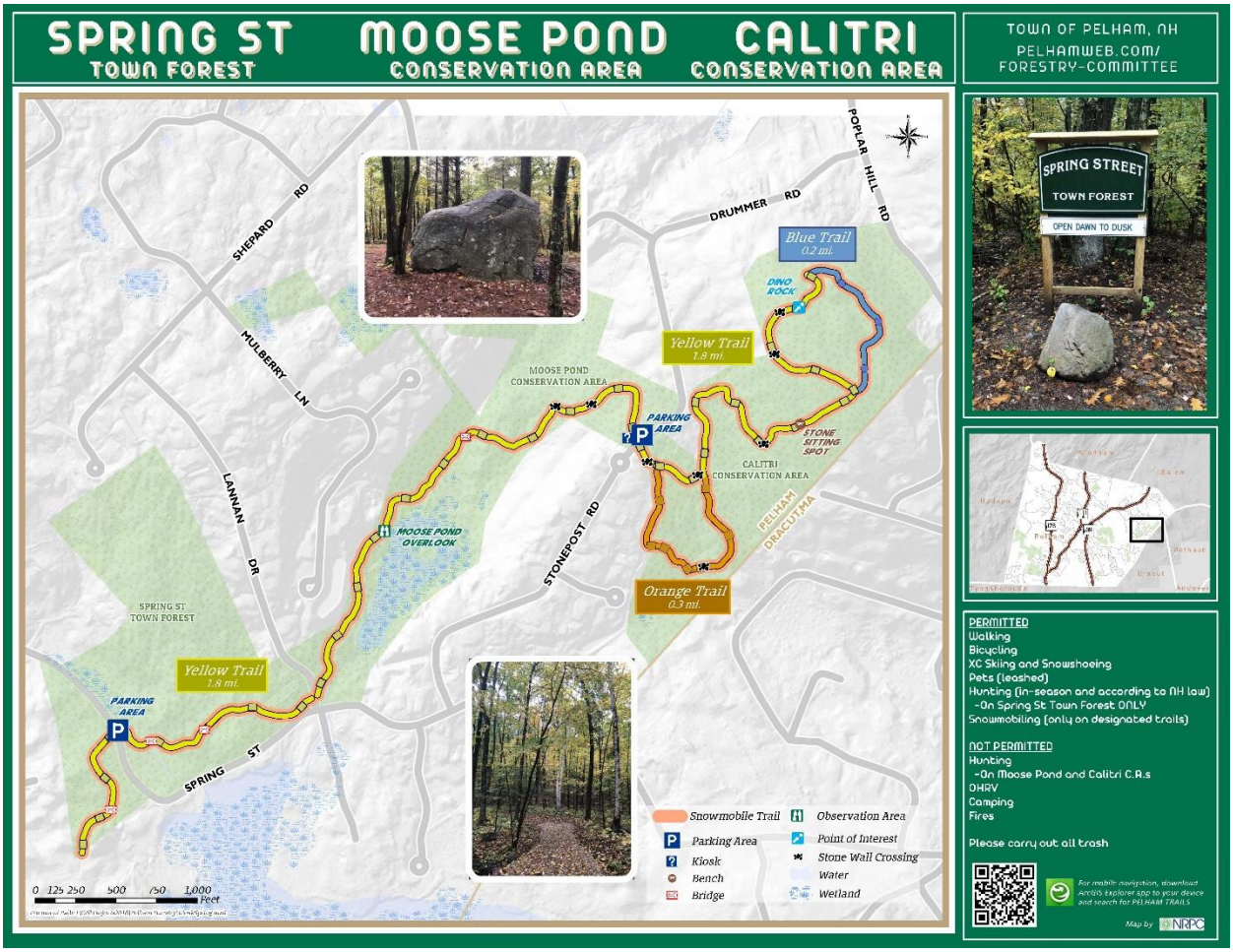
Merriam Farm (47 acres) - Mammoth Road
Designated as a town forest in 2020, Merriam Farm is Pelham's newest town forest. The 2020 management plan identified eight separate stands of trees dominated by white pine and red oak. A timber harvest is planned for 2022. Approximately half of the property is forested and importantly, the site includes 16 acres of former agricultural fields. The balance of the property is considered to be wooded wetland. In addition to the planned harvest, improvement plans include the development of trails and a seating area at Beaver Book.

Moeckel Road Wood Lot (76 acres) - Moeckel Road
Moeckel Road lot was designated as a town forest in 2019. The management plan, also prepared in 2019, identified seven separate stands of trees mostly comprised of white pine (89%), black oak (5%), and red oak (3%). In total 607,053 boardfeet or 328 cords is estimated within the stands. A timber harvest conducted in 2019 yielded $19,623 in revenue. The management plan is scheduled to be updated in 2033 and the next harvest is planned for 2034. The property is heavily forested and incudes a large wetland area. The Moeckel Road lot provides important wildlife habitat areas and is known to contain five officially recognized Threatened or Endangered species including spotted and Blanding's turtles and three species of plants.

Muldoon Park & Town Forest (40 acres) – Route 128
Though a harvest was conducted on the property in 2006/2007 that brought in $27,103 in revenue, Muldoon Park is currently managed by the Parks & Recreation Department and is heavily used for active recreation. As such, no future harvests are planned. The Park includes an excellent trail system that runs along an abandoned railroad grade. Facilities include lighted fields for Little League, Babe Ruth baseball, football, and soccer/lacrosse. The park also has a softball field, playground, and a disc (frisbee) golf course.

Pelham Veterans Memorial Park (69 acres) - Route 128 near State line
Veterans Memorial Park was designated as a town forest in 1991, however the site is managed by the Parks & Recreation Department and includes active recreational facilities including a public beach on Long Pond as well as a multi-purpose field, summer camp lodge, basketball court and trails. The park is open to Pelham residents only. Nine stands of trees are identified on the property in the 2006 Forest Management Plan. The stands are comprised primarily of white pine (62%), black birch (10%), red maple (8%), and white ash (8%). In total 310,075 boardfeet or 302 Cords was estimated from accessible stands. In 1997-98, a biomass harvest removed 94 M square board feet pine and 2,060 tons of chips. The last harvest was conducted in 2008 which brought in $9,307 in revenue. The management plan is scheduled to be updated in 2023 with a harvest planned for 2024.

Public Beach at Veterans Memorial Park



Spring Street Town Forest (44 acres), Moose Pond and Calitri Conservation Areas and Quarry Lots (118 acres) – Stonepost Road & Spring Street

This area includes multiple adjacent parcels that function as a single site. The Spring Street Town Forest was designated as a town forest in 2019. Its most recent management plan was prepared in 2010. A harvest was conducted in 2013 resulting in $20,745 in revenues. The Management Plan is scheduled to be updated in 2028 and the next harvest is planned for 2029. The Moose Pond and Calitri Conservation Areas and Quarry Lots were designated as a town forest in 2006. A forest Management Plan has not been prepared yet, however one is planned for 2022 with a harvest planned for 2023. The Quarry Lots abut old quarries and historic cellar holes. The site includes approximately 2.3 miles of trails.

Wolven Park – (23 acres)

Wolven Park was designated as a town forest in 2019. Forest Management Plan Addendum was prepared for Wolven Park in 2020 as follow-up to the *Ecological Assessment and Land Use Plan for Wolven Park* prepared by Susanne Smith Meyer & Christopher Kane for the Forestry Committee in 2015. As noted in the plan, the primary purpose of the addendum was to "[ ] address boundary line maintenance, invasive plant species management, old field area management, and general forest management considerations."

The restoration and maintenance of a portion of the old field (pictured on the following page), a roughly one-acre remnant of a larger agricultural field, through tree cutting and annual mowing is a key focus of the plan. Open fields provide important habitat area for animal species such as the threatened New England Cottontail, ground birds and other important plant and animal species.

Invasive plant species management is also a key component of the plan. During 2015 and in subsequent visits, significant areas of invasive plant species were observed including glossy buckthorn, common buckthorn, burning bush, autumn olive, multiflora rose, and black swallowwort. Invasive plant species often out compete native plant species and can threaten rare and endangered species. Spraying to combat invasive species was conducted in 2019 and 2021. Wolven Park is subject to a deed restriction to maintain it as a wildlife sanctuary and no hunting is allowed. The property has never been harvested and no future harvests are planned.

B. Recommendations for Town Forest Management

The following recommendations are intended to guide the management of all of Pelham's town forests generally. Specific recommendations can be found for each property in the individual forest management plans prepared for each site. Current forest management plans are available on the town's official website.

- Monitor all the properties regularly for wind damage, ice damage, fire, or disease, and take appropriate corrective actions as needed to ensure the continued health of forest blocks.
- Re-assess each property every 10 to 15 years or as needed and prepare updated 10-year management plans.
- Continually monitor the property for the presence of invasive plants.
- Implement control measures while invasive populations are low. Early detection and treatment are the cornerstone of successful and economical control.
- Maintain and encourage a diverse, vibrant, functioning, indigenous forest by maintaining all native forest components and functions. Retain and protect a portion of the large diameter and unique trees.
- Produce high quality saw timber in an environmentally responsible manner.
- Protect soil, water, nutrient and energy cycles, fragile habitats and conditions, rare plants, animals and exemplary natural communities.
- Maintain and improve wildlife habitat for a variety of mammals and birds.
- Maintain scenic beauty.
- Maintain open agricultural land.
- Maintain and enhance recreational opportunities.
- Replace missing or damaged signs as needed.
- Monitor, clear and widen hiking trails as needed.
- Protect cultural features. Maintain the current condition of these features wherever possible and enhance them if and when desirable. Make every attempt to minimize disturbance of historical features on the property when harvesting timber or constructing trails and roads.

IX. LANDS OF SPECIAL IMPORTANCE

Though the Conservation Commission recognizes that all natural resources are important to maintaining a healthy environment, the Pelham Natural Resources Inventory has identified certain natural resources as priorities for conservation based in part on the existence of multiple overlapping features or co-occurrences of two or more important resources including relation to existing town-owned land, trails, surface waters, large forest blocks, open space, and other important resources. While prioritization should be an on-going process, the principal priority areas identified in the NRI remain priorities for conservation today. These are further described below.

A. Musquash Brook and Gumpas Pond Watersheds

These watersheds were chosen as a top regional priority for both the towns of Pelham and Hudson because of their significance in terms of water resources, wildlife habitat and the prevalence of large forest blocks on both sides of the town line. Though development pressures have increased, and some land has been lost to residential construction (most recently in Hudson), the area continues to contain a vast network of beaver ponds and wetlands and remains in a near natural condition. The New Hampshire Natural Heritage Inventory (NHI) has identified several plant and animal species in this region which are considered rare, threatened, or endangered in the state and the area includes highly ranked New Hampshire Fish & Game Habitat Tiers. In addition, this region includes large areas of important farmland soils. The region was one of the first areas settled in Pelham and Hudson and features several old cellar holes, farm roads, stone walls, culverts and dams and other significant historical resources. The Musquash Pond Conservation area includes 416.5 acres owned by the Town of Hudson along with additional conserved land including 31-acres in Hudson owned by the Town of Pelham. Conserved land in this area in Pelham includes the Cutler Spalding Conservation Area (175 acres) and the Gumpas Pond Conservation Area (185 acres), and the Merriam Cutter Land (181 Acres) together with other smaller conserved parcels. Though a significant amount of land in this critical area is already under conservation, the acquisition of available parcels abutting existing conservation land should remain a priority.

B. Northeast Pelham Greenway

As with the Musquash Brook and Gumpas Pond Watersheds, this area also has the potential to create an inter-connected, inter-municipal conservation system or greenway stretching from Windham in the north, through Pelham, and into the Town of Dracut, Massachusetts to the south. As noted in the 2003 NRI, the area has fields, forests and wetlands that provide prime habitat for moose, deer and other animals and there are multiple Prime Wetlands within the area along with active and passive recreation lands. Though the area is somewhat fragmented, and development patterns impose challenges to connectivity, it also contains several significant conservation and recreation lands including the Peabody Town Forest (155 acres). The greenway could provide for trails and wildlife movement from the Pelham Fish and Game Land, the Helgemoe property, Pine Valley Golf Course, and other properties in the vicinity of Little Island Pond to the Peabody Town Forest and further south into Dracut via the powerlines. The powerlines provide field and brush habitat for a variety of animal and bird species and function well as a wildlife corridor.

C. Farmland

Pelham has few remaining active farms, however, conserving those that remain together with areas of important farmland soils should remain a conservation priority. To protect this valuable resource, the Town should continue to prioritize conservation of these resources including the acquisition of development rights or conservation easements that can conserve the resources while allowing for sustainable farming practices to continue into the future.

D. Recommendations for Lands of Special Importance

- Seek to acquire an additional 1,000 acres of land to achieve a goal of dedicating at least 25% of the land area of Pelham to conservation.
- Prioritize parcels with two or more co-occurring natural resource priority layers, especially adjacent to or in close proximity to existing conservation land.
- Pursue protection for existing farmland and undeveloped lands with Prime/State designated soils.

Old Field at Wolven Park