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VI. WATER RESOURCES

Surface water resources 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 of 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 of 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 the Water Resources Map.

Name Number	Total Length In Miles	Miles in Pelham	Start Elevation	End Elevation	Stream Order	Feeder Streams
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	1^{st}	0
Thirteen-d	0.5	0.5	140	130	1^{st}	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

Table 8: Perennial Streams in Pelham

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 below and all surface waters are represented on Map #3 Water Resources:

Name of Water	Size	Description
Gumpas Pond Data collected in 1994	Area: 89.9 acres Shoreline: 2.7 miles Abundant vegetation Average Depth: Unknown	Class: Mesotrophic Max. Depth Sounded: 24 feet Secchi Disk: 5.36 meters Elevation: 201
Harris Pond Data collected in 1994	Area: 45.7 Shoreline: 1.1 miles Abundant vegetation Average Depth: Unknown	Class: Mesotrophic Max. Depth Sounded: 22 feet Secchi Disk: 3.78 meters Elevation: 152
Little Island Pond Data collected in 1992	Area: 155.0 Shoreline4.8 miles Sparce vegetation Average Depth: Unknown	Class: Oligotrophic Max. Depth Sounded: 55 feet Secchi Disk: 5.49 meters Elevation: 145
Long Pond Data collected in 1978	Area: 120.5 Shoreline 3 miles Common vegetation Average Depth: 13 feet	Class: Oligotrophic Max. Depth Sounded: 25 feet Secchi Disk: 4.39 meters Elevation: 151

Table 9: Lakes and Ponds in Pelham

Source: Survey Lake Data Summary, NH Department of Environmental Services, November 2000.

According to the data collected by the Department of Environmental Services (DES) the ponds in Pelham appear to be healthy. Little Island Pond and Long Pond are classified as Oligotrophic. This is the highest lake classification with low biological production and nutrients. Biological production increases with increased lake fertilization. The key chemical in the eutrophication process or lake aging is the chemical phosphorus.

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Map #3: Water Resources



Lake aging is a natural process by which the lake fills in 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.

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. Gumpas Pond (5.36 m or 17.7 ft.) and Little Island Pond (5.49 m or 18 ft.) had water clarity in the "exceptional" range. The other ponds were in the "good" range.

There are 14 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 waters surface. In doing so, the crowd out important native water plants. As of January 1, 1998, it became illegal transport, purchase, sell, or distribute the 14 species of non-native aquatic plants 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.

The Volunteer Lake Assessment Program (VLAP) ¹⁶ 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 Clean Lakes Program, or the Non-Point Source Local Watershed Initiatives Grant Program. This is the first year that Pelham has participated in the Program. It is highly recommended that monitoring continue on all the ponds in Pelham.

¹⁶ www.des.state.nh.us/wmb/vlap

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 a 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 Protection Act establishes minimum standards for the future subdivision, use, and development of shorelands of 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, fresh water bodies without artificial impoundments, artificially impound fresh water 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 10 or more acres, all fourth order or higher watercourses, estuaries, and coastal waters.



Figure #2: Shoreland Development

Source: A guide to Developing and Re-developing Shoreland Property in New Hampshire, 1995. Illustration Credit: Pamela and Walter Carroll.

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Long Pond, Harris Pond, Little Island Pond, Gumpas Pond, and Beaver Brook below the junction of Golden 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, except limestone can be used within 25 and 250 feet of the reference line. Only low phosphate, slow release nitrogen fertilizer or limestone may be used beyond the 25 feet of the reference line. Natural woodland buffer s must adhere to the following:

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



Figure #3: Developed Lot

Source: A guide to Developing and Re-developing Shoreland Property in New Hampshire, 1995. Illustration Credit: Bill Hoffman, Landscape Architect.

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Figure #4: Minimum Shoreland Protection Standards



C. Recommendations for Surface Waters

• Create a mailing database for property owners within the jurisdiction of the Shoreland Protection Act and undertake a public education program.

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 Inventory (NHI), a program of the Department of Resources and Economic Development, tracks threatened and endangered species and exemplary natural communities in the State. Using a ranking system developed by the Nature Conservancy, the NHI assesses the rarity of a species on a global and state level. State listing ranks are defined by New Hampshire Code of Administrative Rules (RSA 217-A:3). The NHI records five terrestrial (forest) and two palustrine (wetland) exemplary natural communities. 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 fifty-six exemplary natural communities or rare species for Pelham is in Table on the next page and their approximate location is on Map #4.

			# Locati in the la	ons Listed st 20 Years	
Flag	Species or Community Name	Federal	State	Town	State
	Natural Communities - Terrestrial				
***	SNE Dry Central Hardwood Forest on Acidic Bedrock or Till	-	-	3	15
***	SNE Dry Central Hardwood Forest on Acidic Bedrock or Till	-	-	1	15
***	SNE Dry Rich Forest on Acidic/Circumneutral Bedrock or Till	-	-	3	11
***	SNE Floodplain Forest	-	-	1	47
**	SNE Rich Mesic Forest	-	-	1	12
	Natural Communities - Palustrine				
**	Atlantic White Cedar Basin Swamp	-	-	1	28
***	Inland New England Acidic Pond Shore/Lake Shore Community	-	-	1	12
	Plants				
	Arethusa (Arethusa bulbosa)	-	E	Historical	21
*	Atlantic White Cedar (Chamaecyparis thyoides)	-	-	1	44
**	Bird's-Foot Violet (Viola pedata var lineariloba)	-	Т	2	12
	Blunt-Leaved Milkweed (Asclepias amplexicaulis)	-	Т	Historical	12
*	Blunt-Lobe Woodsia (Woodsia obtusa)	-	Т	2	8
***	Bulbous Bitter-Cress (Cardamine bulbosa)	-	E	1	5
**	Early Buttercup (Ranunculus fascicularis)	-	E	1	2
**	Fern-Leaved Foxglove (Aureolaria pedicularia var intercedens)	-	E	1	6
-	Flaccid Sedge (Carex flaccosperma var glaucodea)	-	Е	Historical	1
**	Four-Leaved Milkweed (Asclepias quadrifolia)	-	Т	2	9
	Fringed Gentian (Gentiana crinita)	-	Т	Historical	28
	Goat's-Rue (Tephrosia virginiana)	-	Е	Historical	6
***	Hairy Bedstraw (Galium pilosum)	-	Е	1	5
**	Hairy Stargrass (Hypoxis hirsuta)	-	Т	3	13
***	Hoary Mt. Mint (Pycanthemum incanum)	-	Е	4	5

Table 10: New Hampshire Natural Heritage InventoryRare Species and Exemplary Natural Communities List for Pelham

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		# Locations Listed			
Flag	Spacios or Community Nama	Federal	in the la	st 20 Years	State
Flag	Inflated Sedge (Carey hulleta)	reuerai	F	Listorial	51410
	Long-Fruited Anomone (Anomone cylindrica)	-	L	Historical	11
	Maryland Tick-Trofoil (Dosmodium marilandicum)	-	- F	Historical	11
	One-Sided Rush (Juncus secundus)	-	E	Historical	4
	Pink Azalaa (Phododondron pudiflorum)	-	E	Historical	2
***	Prostrato Tick-Trafail (Desmadium ratundifalium)	-	Г	2	2
	Purple Milkwood (Asclenias purpurascens)	-	-	Historical	3
***	River Birch (Betula nigra)	_	Т	1	12
**	Ruo Anomono (Anomonolla thalictroides)	_	т	2	5
	Siberian Chives (Allium schoenoprasum var sibiricum)	_	Т	Historical	7
***	Sickle-Pod (Arabis canadensis)	_	Т	3	7
***	Skydron Aster (Aster natens var natens)	_	Т	3	10
*	Slender 8-Flowered Fescue (Festuce octoflore var tenella)	_	F	1	3
	Slender 8-Flowered Fescue (Festuca octoflora var tenella)	_	F	Historical	3
*	Slender Bush-Clover (Lespedeza virginica)	_	Т	2	6
	Slender Knotweed (Polygonum tenue)	_	F	Historical	3
	Slender Pinweed (Lechea tenuifolia)	_	F	Historical	2
	Slender-Flowered Muhlenbergia (Muhlenbergia tenuiflora)	_	-	Historical	3
**	Small Bidens (Bidens discoidea)	_	E	1	9
**	Smooth-Forked Chickweed (Paronychia canadensis)	-	T	2	7
**	Smooth-Forked Chickweed (Paronychia canadensis)	-	T	4	7
	Spiked Needlegrass (Aristida longespica var geniculata)	-	E	Historical	4
*	Sprout Muhlenbergia (Muhlenbergia sobolifera)	-	Т	1	6
***	Swamp Azalea (Rhododendron viscosum)	-	Т	10	42
	Torry's Mountain Mint (Pycanthemum torrei)	-	E	Historical	1
*	White-Topped Aster (Sericocarpus linifolius)	-	Т	1	6
**	Wild Garlic (Allium canadense)	-	Е	1	5
	Wild Lupine (Lupinus perennis)	-	Т	Historical	37
	Wild Senna (Cassia hebecarpa)	-	Е	Historical	10
	Vertebrates – Reptiles				
**	Blanding's Turtle (Emydoidea blandingii)	-	-	1	57
	Eastern Box Turtle (Terrapene carolina)	-	-	Historical	6
	Vertebrates – Fish				
	Banded Sunfish (Enneacanthus obesus)	-	-	Historical	8
	Invertebrates - Mollusks				
**	Brook Floater (Alasmidonta varicosa)	-	Е	1	30
**	Eastern Pondmussel (Ligumia nasuta)	-	-	1	4

Listed E = Endangered T = Threatened

Flags

*** = *** =

Highest Importance Extremely High Importance These flags are based on a combination of: 1) how rare the species or community is, and 2) how large or healthy its examples are in that town. Please contact Natural Heritage Inventory at (603) 271-3623 for more information

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Map #4: Natural Heritage Inventory



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 coyote, otter, 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. It is recommended that the Conservation Commission and interested citizens participate in the "Keeping Track" Program.¹⁷ This program uses animal tracks to identify habitats and feeding grounds in a systematic manner for a variety of animals. The information gained can be the start of an inventory and a monitoring system of prime habitats for future conservation.

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. Many agency scientists (USFWS, DOD, and Audubon) are involved in the Partners in Flight Program.¹⁸ The 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.

¹⁷<u>http://www.keepingtrackinc.org</u>.

¹⁸www.partnersinflight.org

American Bittern	Eastern Wood Pewee	Prairie Warbler
Black-billed Cuckoo	Veery	Palm Warbler
Yellow-billed Cuckoo	Grey Catbird	Bobolink
Chimney Swift	Field Sparrow	Wood Thrush

Table 11: National Audubon Society's Watch List

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

- Relative abundance
- Breeding distribution
- Non breeding distribution
- Conservation threats during breeding season
- Conservation threats during the non breeding 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. Communities should strive to preserve the aesthetics and functions that open fields offer.

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 are recommended. Mammals such as chipmunks, opossum, raccoons, etc. also use cavity trees, so larger numbers of snags benefit their populations as well.

C. Plants

Plants species in Pelham are again dominated by those species commonly found in southern New Hampshire. The 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 11 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.

Source: Audubon Society's Watch List, 2001.

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	

Table 12: New Hampshire Plant Species of Special Concern

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. According to the New England Wildflower Society, 42% of all species on the Federal Endangered Species List are listed in part due to invasive species (and for 18%, invasive species are the sole reason for their listing), and are destroying public natural areas at an estimated rate of 4,600 acres per day. The common invasive plant species found in New Hampshire are listed in the table.

 Table 13: Common Invasive Plants in New Hampshire

Japanese barberry	Japanese stilt grass	Garlic mustard	
Oriental bittersweet	Spotted knapweed	Autumn olive	
Common buckthorn	Japanese knotweed	Russian olive	
Glossy buckthorn	Purple loosestrife	Common reed	
Burning bush	Norway maple	Multiflora rose	
Tartarian honeysuckle	Mile-a-minute	Black swallow-wort	
Japanese honeysuckle	Eurasian milfoil	Tree-of Heaven	

Source: "Habitats", University of New Hampshire Cooperative Extension, 2002.

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 is 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.

E. New Hampshire Ecological Reserve System Project

In 1995 a core team of representatives from the NH Division of Forest and Lands, NHG Fish and Game, UNH, The Nature Conservancy, and the Society for the Protection of New Hampshire Forests established the NH Ecological Reserve System Project. The project mission is to establish and support a well-coordinated, comprehensive system of public and private lands voluntarily dedicated to protecting the full spectrum of biological diversity in New Hampshire.

An ecological reserve system is a collection of lands managed and monitored to protect biodiversity in all its forms. The State is divided into nine ecological regions based on the U.S. Forest Service analyses of climate, topography, and soils. The Town of Pelham is located in the Southern New England Coastal Hills and Plain Ecoregion.

In 1998, The Project's Blueprint for Biodiversity Conservation in the Granite State set forth the following goals:

- Identify priority conservation sites throughout the state using scientific criteria for reserve selection and design.
- Work with the Land and Community Heritage Investment Program (LCHIP) and applicants to nominate and select ecological reserve projects for state funding.
- Collaborate with partners to maintain and expand a centralized biodiversity and conservation lands database.
- Ensure expanded field inventories by the Natural Heritage Inventory, the Fish and Game Department, private organizations, universities, and colleges.
- Enhance protection of biodiversity on ecologically significant lands by working with public and private landowners on their protection and management strategies.

The Project has developed a set of criteria that can be used to identify "ecologically significant areas" in the state that contain or support biodiversity. The seven criteria are listed below.

- The property must contain at least a portion of a rare or exemplary community.
- The property must contain at least a portion of a documented rare plant species.
- The property must contain at least a portion of a critical wildlife habitat.
- The property must contain at least a portion of a rare animal species population.
- The property must contain at least a portion of an unfragmented habitat for wide-ranging animal.
- The property must contain at least a portion of a rare or exemplary geologic formation
- The property can contribute to the functioning and viability of an existing Ecological Reserve or establish a corridor between another conservation area.

Each of these criteria has a more detailed set of information that further defines each category. Public or private landowners whose property supports one or more of these features is eligible for inclusion in the ecological reserve system. It is recommended that lands in the known general area of exemplary communities be further investigated by the Project staff for further review.

F. Recommendations

• The Pelham Fish and Game land, the golf course, Camp Runnels and the watershed of the pond, Little Island Pond Prime Wetland and the surrounding uplands along with the Peabody Town Forest and the surrounding lands with powerline easements should be

recognized as a greenway corridor and expanded so that movement of wildlife can continue to the Dracut.

• Require a complete inventory prior to development in areas with identified NHI species.

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 43 inches of precipitation per year. Most of this precipitation is evenly distributed throughout the year, though there can be occasional droughts in the summer. The area's climate is ideal for the growth of forest trees.

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.

According to the Forest Land Base Study "*New Hampshire's Vanishing Forests*",¹⁹ larger parcels are more likely to remain as forest in the future. In a survey of landowners with acreage less than 25 acres, clearing for development was more important than sustainable forestry. The table below does not differentiate between good forestry management and development but with over 600 houses proposed in 2001, it is likely that the majority was cleared for development. The timber tax is estimated at 10% of the total harvest revenue.

¹⁹ Society for the Protection of New Hampshire's Forests, Forest Land Base Study: New Hampshire's Vanishing Forests, 2001.

Town	1996 Timber Tax	1998 Timber Tax	1999 Timber Tax	Average Tax
Amherst	\$12,974	\$7,858	\$8,834	\$9,889
Brookline	\$6,164	\$12,315	\$12,906	\$10,462
Hollis	\$0	\$18,658	\$26,808	\$15,155
Hudson	\$3,268	\$7,306	\$1,027	\$3,867
Litchfield	\$200	\$6,584	\$10,442	\$5,742
Lyndeborough	\$15,128	\$20,175	\$34,984	\$23,429
Merrimack	\$13,354	\$7,633	\$10,495	\$10,494
Milford	\$16,644	\$14,393	\$14,918	\$15,318
Mont Vernon	\$4,700	\$17,737	\$16,816	\$13,084
Nashua	\$3,696	\$6,748	\$3,254	\$4,566
Pelham	\$7,533	\$23,358	\$2,221	\$11,037
Wilton	\$4,127	\$22,198	\$30,535	\$18,953

Table 14: Silviculture in the Nashua Region

Source: New Hampshire's Vanishing Forests, Society for the Protection of New Hampshire Forests, 2001.

The table below provides a summary of Pelham's forest facts derived from the study, "*New Hampshire's Changing Landscape*", produced by the Society for the Protection of New Hampshire Forests in 1999. The forest and habitat data provided in that report is derived from 1992 – 1993 Landsat satellite imagery, the most recently available data source on forest resources on a regional level.

Table 15:Pelham Forest Facts

Area and Percentage in Forest (1993)	11,181.0 acres or 66.8 percent.
Total area in Forest Blocks > 500 acres	3,118.48 acres.
Number of Forest Blocks > 500 acres	5 forest blocks > 500 acres.
Average and Median Size of all Forest Blocks	132.4 acre average and 61.2 acre median.
Percentage of Forest Blocks > 10 acres that are protected	8.8 percent blocks > 10 protected.
Predicted Decline in Forest Area by 2020	1,886.0 acres decline predicted.
Predicted % Decline in Forest Block Size by 2020	27.6 percent decline predicted.

Source: New Hampshire's Changing Landscape, Society for the Protection of New Hampshire Forests, 1999, based on 1992-1993 landsat data.

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Map #5: Forest Resources



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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. Forestland Evaluation and Site Assessment (FLESA) Process

The FLESA²⁰ process is a planning tool to aid towns as they plan for future development and natural resource needs, with careful consideration of existing and potential effects. The FLESA process has two basic components and is based on a point system.

The first is referred to as land evaluation. This is a technical evaluation of a parcel or site's ability to grow desirable species based on soil information. The land evaluation considers the productivity potential of the soil as well as the probability that the tree species growing on site will produce quality trees. The key tool is using GIS to identify where Important Forest Soil Groups (IA, IB, IC, IIA, IIB) and Forest Type Cover is located.

The second phase is site assessment. Specifically, FLESA will help inventory forest based resources, and assess commercial timberland, wildlife habitat, recreation use, and scenic resources. Timber resource assessment would include examining accessibility to the site, environmental limitations, parcel size, and contiguous acreage. The ranking for wildlife would use the same criteria as timber resource but also includes known threatened and endangered species, unique or critical habitat, and different wildlife attractors such as streams, orchards, etc. Recreation resources would include accessibility, trail type present, remoteness, and recreational activity present. Scenic resources consider the type of view, topographic features, special or unusual features, and vegetation.

²⁰ North Country and Southern New Hampshire Resource Conservation and Development Area Councils, Planning for the Future of Local Forests: A Guide for NH Towns Using the Forestland Evaluation and Site Assessment Process, 2001.

B. Pelham's Town Forests

Pelham has eight town forests totaling approximately 650 acres scattered throughout the community. The town has a Forest Management Plan prepared for each woodlot by a professional forester. 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 plans is to promote forest health, protect sensitive area 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.

Silverculture 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 left 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 or on an as needed basis such as wildfire or insect infestation. A public workshop is presented each time a management plan is revised or harvests planned. Specific recommendations are given for each forest and general forest resources recommendations will be presented at the end of this section.

Raymond Park (224.46 acres) - Keyes Hill Road/Rt. 128

The 1995 Forest Management Plan identified thirteen different stands of trees. The 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. 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.

Recommendations for Raymond Park



- Widen over grown hiking and cross-country trails.
- Survey boundaries to ensure that they are correctly located.
- Create more public awareness of this under utilized recreation resource.
- Selected tree stand improvement (TSI) to release young pine along the old railroad track and in the area cut in 1995.
- Replace rotting signs.

Muldoon Town Forest (68 acres) - Route 128



Peabody Town Forest (123.06 acres) - Old Lawrence Road

Eight different stands of trees are identified in the management plan. 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 1483 tons wood chips. Harvests provided good thinning and yellow pine regeneration.

The forest is rarely used except for hunting. The only trail is a Class VI access road and the powerline (20.4 acres) which cross through the middle of the forest. The powerline is cleared of tree species while allowing for low growing brush species to grow providing valuable food for wildlife. The forest contains 6 acres of wetlands and vernal pools.



Recommendations for Peabody Town Forest

- Install Signage to let residents know this is public land.
- Remove fire damaged trees and replant next to the cell tower on Old Lawrence Road.
- Improve access by upgrading the dirt road in the northern section and create a small parking area at the logging staging area.
- Survey the missing property lines behind residential homes on Old Lawrence Road.
- Block off access with boulders or gate to prevent dumping.

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Quarry Lots (27.85 acres) – Shepard Street off Ledge Road

The Quarry Lots abut old quarries and historic cellar holes. The 1998-99 harvest yielded 50 M boardfeet pine and 5 M oak.

Recommendations for the Quarry Lots

- Research deeds to determine if a right of way (ROW) exists on the Harris property to access the southern landlocked parcel.
- Negotiate a ROW easement with the abutter to enhance the trail network.
- Create an interpretive nature trail that would take into account the natural history of the quarries.
- Survey work around residential housing.
- Build a boardwalk over the stream to connect Tree Stand I and IV on Map/Lot 24-12-213.
- Consider a conservation easement or purchase of the quarry properties.
- Initiate a tree stand improvement (TSI), especially in the back lot.





Veterans Memorial Park (50 acres) Route 128 near State line

Ten stands of trees are identified on the property. In 1997-98, a biomass harvest removed 94 M square board feet pine and 2,060 tons of chips. The property has a beach and recreation area on Long Island Pond. During the summer, the Pelham runs a day camp. Numerous woods trail wind throughout the property and are maintained by the campers.

Recommendations for Veterans Memorial Park

- Monitor the dying white ash tree stand north of the access road and remove before they become a hazard.
- Install a gate and encourage more police presence to deter littering, campfires and all terrain vehicles.
- Survey abutting property on the eastern side of Stand V for encroachment violations.
- Build an information kiosk and post educational materials.

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Kirby Forest/Cul-De-Sac Woodlot (64 acres) - Woodlawn Circle

Six tree stands identified in the management plan. The forest has not been harvested because the current access deeded by developer is on 40% slope. Recreational activities include snowmobiling, mountain biking and hiking. Scattered wetlands support a variety of wildlife.

Recommendations for the Kirby Forest

- Resolve ROW for forest harvesting.
- Conduct biomass harvesting in stands I-III to encourage new seedlings and browse from the hardwood stumps sprouts.
- Develop trails in Stand III to enhance the overall trail network.



Blueberry Circle Woodlot (19.86 acres) – Blueberry Circle

The property is primarily used by surrounding residents for hiking and biking. Vernal pools are scattered within the four identified tree stands. In 1997-98, a harvest yielded 123 M boardfeet of pine.

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Cul-deSac Lot

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Recommendations for Blueberry Circle Woodlot

- Advertise and enhance this under utilized recreational spot to residents.
- Consider extending Spring Street for fire access.

Sherburne School and Marsh Road Parcel

Used mostly for school educational opportunities since the property illustrates the natural succession of old fields changing to predominately white pine forest and how correct management of mature forests will produce a new crop of trees on a sustained yield basis.

Recommendations for the Sherbourne School Woodlot

- Keep the open field area in stand III mowed for browse for a variety of wildlife.
- Create interpretive trails through the wetland areas.
- Selective thinning and harvesting on mature stands.



C. Overall Recommendations for Forest Resources

- Leave large oaks for mast production (acorns) for food for wildlife and forest regeneration.
- Better signage is needed in every forest.
- Pursue legal easements on all of the deeds to keep these parcels protected and not used for other municipal needs in the future.
- Leave a minimum of 2-3 snags per acre for cavity nesting species of birds, waterfowl, and animals.
- Inventory all existing trails using Geographic Positioning System (GPS).
- Create a trail system map and install signage in all Town forests.
- Initiate a long-term insect monitoring plan for Hemlock Woolly Adelgid, weevils, and others.
- Seek funding for surveying needed in the Town Forests.
- Maintain 50 foot buffer around vernal pools and 100 feet on property lines and surface waters.
- Use the Forestland Evaluation and Site Assessment (FLESA) for future forest planning.
- Research ownership of the old railroad line and add to the town-wide trail map.

IX. LANDS OF SPECIAL IMPORTANCE

Generally in a Natural Resources Inventory, certain natural resources are prioritized by the community. These may include a single or multiple resources. The NRI Committee recognizes all natural resources as important due to the rapid development in Pelham. In an effort to prioritize natural resources NRPC mapped multiple overlapping features or co-occurring resources of two or more. Map #6 Lands of Special Importance illustrates the multiple resources parcels and their relationship to town-owned land, trails, surface waters or open space. Research can now be done to establish the significance of the property, acreage, the imminence of threat of development and the cost of conserving the land. The parcels can then prioritized. The prioritization should be an on-going process since Town needs and landowner status will change. The Town recognizes that connectivity is invaluable for the movement of wildlife. The following to greenway corridors have been identified as the most important.

A. Musquash Brook and Gumpas Pond Watersheds

These watersheds were chosen as a the top regional priority for the towns of Pelham and Hudson because of their significance in terms of water resources and wildlife habitat. The area contains 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 species in this region which are considered rare, threatened, or endangered in the state. This region was one of the first areas settled in Pelham and Hudson. The area is dotted with old cellar holes, farm roads, stone walls, culverts and dams and other significant historical resources. The Nash-Hamblett (Musquash Conservation Land, 416.5 acres) and the Guertin (50 acres) properties already provide some protection to the watershed in Hudson. The New England Forestry Foundation also owns land in both towns.

B. Northeast Pelham Greenway

This corridor is also has the potential of inter-municipal joining conservation lands in Windham, referred to as the Southeast Lands to the Dracut, Massachusetts line. The area has fields, forests and wetlands that provide prime habitat for moose, deer and other animals. There are two Prime Wetlands within this tract of land. The Girl Scout Camp and the land along Dutton Road comprise a large area of the Little Island Pond watershed. The greenway would run through Pelham just east of Simpson Mill Road the capped landfill, provide wildlife movement through Pelham Fish and Game Land, the Helgemoe property, Pine Valley Golf Course, Little Island Pond Prime Wetland and its surrounding upland areas, the watershed along Dutton Road, as well as the Girl Scout Camp to the Peabody Town Forest via the powerlines and the land surround the Peabody Town Forest. The area from Dutton Road to the Dracut line provides additional movement for wildlife since it is forested. The powerlines provide field and brush habitat for a variety of animal and bird species as was noted in the Prime Wetland Study in 1999.

The Town's agricultural lands are recognized as an important and endangered resource with few State or local incentives for keeping viable agricultural lands in production. To protect this valuable resource, the Town should take steps to protect active and idle agricultural lands from development for other uses and create incentives which encourage agricultural lands to be kept in, or returned to, productive farm use. The Trust for New Hampshire Lands Program or the Land and Community Heritage Investment Program may assist the Town in this endeavor.

C. Recommendations for Lands of Special Importance

- Prioritize parcels with two or more GIS data layers for future protection based on the Town's current needs (i.e., future water supply, town forest).
- Pursue farm protection for existing or undeveloped lands with Prime/ State designated soils.

Map #6: Lands of Special Importance



X. INFORMATION RESOURCES

- Amman, A., and A. L. Stone, A Method for the Comparative Evaluation of Non-Tidal Wetlands in New Hampshire, 1991.
- Comprehensive Environmental Inc., *Groundwater Protection Recommendations and Implementation Plan*, 2001.
- Comprehensive Environmental Inc., *Phase II Stormwater Rule Summary and How Municipalities Can Prepare for Compliance*, 2000.
- <u>http://pubpages.unh.edu/~pcj/ceop.html</u>
- http://pubpages.unh.edu/~pcj/nr775.html
- New Hampshire Department of Resources and Economic Development, *Open Space Trail Plan*, 2000.
- NH Conservation and Public Lands GIS Layer distributed by GRANIT 2002 at: http://granitweb.sr.unh.edu/granit_clv/viewer.jsp.
- NH Fish and Game Department, Nongame and Endangered Wildlife Program, *Identification and Documentation of Vernal Pools in New Hampshire*, 2001.
- North Country and Southern New Hampshire Resource Conservation and Development Area Councils, *Planning for the Future of Local Forests: A Guide for NH Towns Using the Forestland Evaluation and Site Assessment Process*, 2001.
- Society for the Protection of New Hampshire Forests, *New Hampshire's Changing Landscape*, 1999.
- Society for the Protection of New Hampshire's Forests, Forest Land Base Study: *New Hampshire's Vanishing Forests*, 2001.
- State of New Hampshire, *RSA 236:111-a Exception*.
- The NH Department of Environmental Services, *New Hampshire Non-Point Source Management Plan*, 1999.
- U.S. Fish and Wildlife Service, Schoolyard Habitat Project Guide, 1999.
- United States Geologic Survey, Water Resources Investigations Report 86-4358, 1987 Hydrogeology of Stratified-Drift Aquifers and Water Quality in the Nashua Regional Planning Commission Area, South-Central New Hampshire.
- University of New Hampshire, Pelham Prime Wetland Assessment, 1999.
- www.des.state.nh.us/wmb/vlap
- <u>www.epa.gov/npdes</u>
- <u>www.keepingtrackinc.org</u>
- <u>www.partnersinflight.org</u>
- <u>www.wildlife.state.nh.us</u>

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