

Forest Stewardship Plan

(10-Year Planning Period)

Town of Pelham
Gumpas Pond Conservation Area
Pelham and Hudson, NH
153.3 Acres
December 19, 2005

Brian E. Johnsen
NH LPF #363
12 Peacock Hill Rd.
Weare, NH 03281
(603) 387-9532

Property Owners: Town of Pelham
Location: Gumpas Pond Conservation Area
Total Acreage: 153.3 +/- Acres
31.2 +/- Acres in Hudson, NH
122.1 +/- Acres in Pelham, NH
Map/Lot Numbers: Map 226, Lot 1 – Hudson
Map 26, Lot 2 – Pelham
Date Prepared: December 19, 2005

General Description of the Property

This fabulous piece of property, located on the western line of Pelham, NH, and the eastern line of Hudson, NH, is a critical parcel to protect from development. The northwestern corner of this property is part of the conglomeration of wetlands known as Musquash Swamp between Merrill Hill in Hudson and Gumpas Pond in Pelham. This property was prepared for a development plan, with interior roads and an existing gravel pit, but will now remain as open land forever.

Boundaries

The boundaries on this property range from very discernible to unknown. That is to say, the boundaries that are on land have been well-surveyed and are identifiable. The southeastern corner lines around a small houselot on Hinds Lane in Pelham need to be relocated due a difference in the orientation of the survey map and actual field data (grid north vs. magnetic north). Many of the boundaries are stone walls, making them very easy to find in the field. However, many of the northern corners are located in the wetland the flows into Musquash Swamp, making corner and line identification impossible. Furthermore, there is a discrepancy between the deed and an established 1979 survey for the boundary lines in Hudson. The possible error would drop the acreage about 2 acres. One boundary line, located in Stand 8 coming off Gowing Road (along the Town line) was not discernible and now has a lawn encroachment, which should be addressed at some point. All maps in this management plan use the boundaries as listed from the deed.

Access

This property technically has frontage on three town roads. However, Gumpas Pond Road, the southern boundary for this property, is an old Class 6 road that has not been upgraded in years. The access point on Hinds Lane in Pelham is quite narrow and heads up a steep hill immediately off of the road, which would make truck access quite difficult. Therefore, the best access for this property is from Gowing Road in Hudson. This road is a cul-de-sac, with the access point being at the dead end part of the road. This road has been used for logging access before by New England Forestry Foundation (NEFF), which owns the land immediately to the south. Gowing Road was used as the access point for the machinery involved in the gravel pit excavation, and is currently heavily used by 4-wheel-drive vehicles and ATV's to access the network of roads within this property.

Forest Types & Harvest History

Forests with varying composition in terms of species, age, and density are able to respond with more resilience to catastrophic events than monocultures. Most trees in unmanaged, overgrown forests are chronically short of much-needed nutrients, sunlight, and water, and are therefore constantly living in a stressed environment. Pre-stressed trees are much more susceptible to disease than their healthy counterparts growing in a well-spaced, healthy forest. Forests are broken down into management units called stands, which are areas of trees with similar species composition, size, and frequency of occurrence.

This particular property has an abundance of harvest history. Judging from the stone walls and proximity to rivers, this woodlot most likely was cleared in the mid-1800s for sheep pasture, part of the movement across much of New England to increase wool production for water-powered mills along the banks of most New Hampshire waterways. When the pastures were abandoned, white pine grew in and the area was forested again. Subsequent cutting removed the white pine from some areas, and the open environment allowed red oak to seed in and become established in direct sunlight. The oldest trees on this property are likely 80-100 years old, although most are younger. More recently, this property was slated for development, as mentioned, and some areas were harvested quite heavily to remove the valuable timber before development. Across most of the property, much of the sawtimber-value white pine was removed, leaving behind a property that is mostly covered with a mixture of hardwood species. There are few areas of white pine that were left, either because of proximity to wetlands, or simply because the stocking was so high at the last harvest that some pine was left. This harvest history has resulted in a number of different conditions on the ground today. Stand 3 was heavily harvested and currently has very few sawlog-value trees. Stand 7 was clearcut to expand the gravel pit, and is growing back to saplings. Stand 8 was also harvested rather heavily, but this stand still has valuable timber growing and has a lush understory of hardwood regeneration. Other stands, such as 4 and 9, appear not to have been harvested at all, and are overstocked at the moment. All in all, this property has a very diverse history and therefore has rather diverse growth conditions in its current state.

In quantitative terms, about 100 acres of this property are considered forestland, growing more than 650 MBF (thousand board feet) of timber and more than 1,000 cords of hardwood and softwood pulp. Red oak and black oak account for about two-thirds of this sawtimber volume, with 225 MBF and 200 MBF respectively. White pine makes up another 18% of the standing timber volume with 124 MBF. White ash and hemlock, with 27 MBF and 24 MBF respectively, account for about 4% of the total sawtimber volume. The remaining 10% of timber volume is made up of various hardwoods, including white oak, poplar, white birch, red maple, and other species. One species notably lacking in this spectrum is black birch, which is particularly curious since there is so much black birch regeneration. Most of the volume of this species, which is present, is simply too small to be considered sawtimber at the time of this inventory. More details on the timber cruise are available below, and a complete summary is available on page 6.

Soils, Terrain, & Hydrology

Forests are essential for preventing erosion of existing soil and maintaining clean water. One of the main reasons for purchasing this property was to maintain forested land around the numerous wetland areas found on this property. Nearly one-third of this property is considered wetland or covered with standing water.

Riparian and wetland areas are the places that open water and upland sites meet. A riparian zone is the general term for the area where water and land meet, whereas a wetland is an area in a riparian zone that specifically has hydric, or wet, soils as well as vegetation that grows on that type of soil. Riparian areas are important a number of reasons. They offer critical habitat for many wildlife species, providing shelter, food, water, and travel corridors. They are also very useful for flood control by acting as a sponge during times of high water volume, and then releasing that water slowly and consistently over time. Without wetlands, streams would fluctuate greatly between periods of high flow and dry streambeds. Finally, riparian areas are key for filtering water as it travels from upland sites to the open water, keeping out many chemical impurities and keeping water silt-free.

Soils on this property vary considerably, from excessively-drained this upland soils with exposed bedrock to very poorly-drained soils with standing water. Some areas have deep, fertile soils and other areas, like around the gravel pit, are quite dry and are growing drought-tolerant saplings. This property is part of the Musquash Marsh watershed, and the predominant drainage is to the north and northwest.

Many areas of this woodlot have had terrain alteration, in preparation for the development that never came to fruition. Consequently, there are drainage patterns that have been man-made and areas that have been flattened off to be more conducive for building purposes. That being said, the southeast third of this property has been altered very little, and has some nice hills and valleys, offering a variety of slopes. Where changes have been made, the land appears to have adjusted over time, and wildlife is using the property in the middle of these altered areas. Overall, this property has gently rolling terrain, with very few rock outcrops or sheer cliffs. One unique feature of this property is Adam's Rock, located at one of the northeastern boundary corners. This large formation of boulders is quite attractive and is a nice location for viewing wetland birds.

The single biggest threat to the wetlands, and the associated wildlife in them, is OHRV usage on this property. Wheeled vehicle users seek this property for the "mud factor," which generally means they are driving through sensitive wetland areas. This is particularly true in the area of Adam's Rock and other points where the gravel roads lead to wetland edges.

Wildlife

Biological diversity can be described as the variety of plants and animals located in a given tract of land or landscape and the communities that are formed by that variety of species. Two of the biggest threats to biological diversity today are loss of habitat to non-forest uses and invasive species. This property has enormous value for wildlife, in the areas of food, water, cover, and breeding habitat. The wide variety of forest types and ages, the variable terrain, and presence of flowing and standing water all help to make the property very diverse when it comes to flora and fauna. What is particularly valuable

about this property is the fact that most habitats are connected to one another in some way; in other words, there are no areas that are isolated from the rest of the property.

As mentioned, the presence of water adds a great deal to the value of this property for wildlife. Wildlife professionals have often documented that water greatly increases the diversity of wildlife populations. This is most likely due to the wide variety of fish, birds, mammals, amphibians, reptiles, and invertebrates that depend on water for life, which then attract predators as well, the great horned owl being one example. Beavers have maintained this water presence through dams across the main brooks that flow north: the northeastern wetland area is held by at least 2 main dams, for example.

Another habitat type that is rapidly becoming rare in New England is that of early successional species. This dense, brushy growth is excellent cover and breeding grounds for a number of small upland mammals and birds. Stand 7 is a 4-acre example of this type of habitat, although it is starting to get beyond the “early successional” stage and grow into forest. Maintaining this and other areas around the property in the early successional stage would be beneficial to wildlife species that need this habitat.

One habitat type that this property lacks is that of an open field environment. Open fields and/or pasture-type settings offer deer and turkey huge benefits throughout the summer, especially since insects make up the primary diet of young turkey during the summer. More than that, these areas are frequented by small mammals, which in turn attract predators such as raptors, weasels, bobcat, and coyote. Another habitat missing from this property is that of a mature conifer forest. Looking at the landscape at large, however, one can find mature conifer forests adjacent to this property, whereas open fields are not close to this property, which makes the open fields more of a priority than mature conifer forest.

Overall, this property has a wealth of diverse habitats that support a large number of different species of birds, waterfowl, upland game, mammals, amphibians, reptiles, and their supporting flora.

Timber Cruise

A detailed timber cruise was completed on the property yielding 42 plots of tree data across each forested stand. This data was used to tabulate the current tree growth on the property and the field notes made during this cruise helped to create many of the maps in this management plan. A cruise is a statistical sample that is used to determine the volumes of various forest products growing on the property. This cruise generates volumes in terms of cords (for all trees 6-11” in diameter, or trees larger than 11” that are not suitable for sawtimber) and board feet (for trees 12” and greater in diameter that could be sold and sawn into boards). The diameter of a tree is measured at 4.5’ above the ground, which is an industry standard referred to as diameter at breast height (DBH). From this intensive cruise, a total of 13 stands were delineated for this property. Stands are areas of trees with similar species composition, size, and frequency of occurrence. These stands will be the basis for the methodical analysis of the forest management plan, and are depicted on the following Stand Map.

Landowner Goals & Objectives

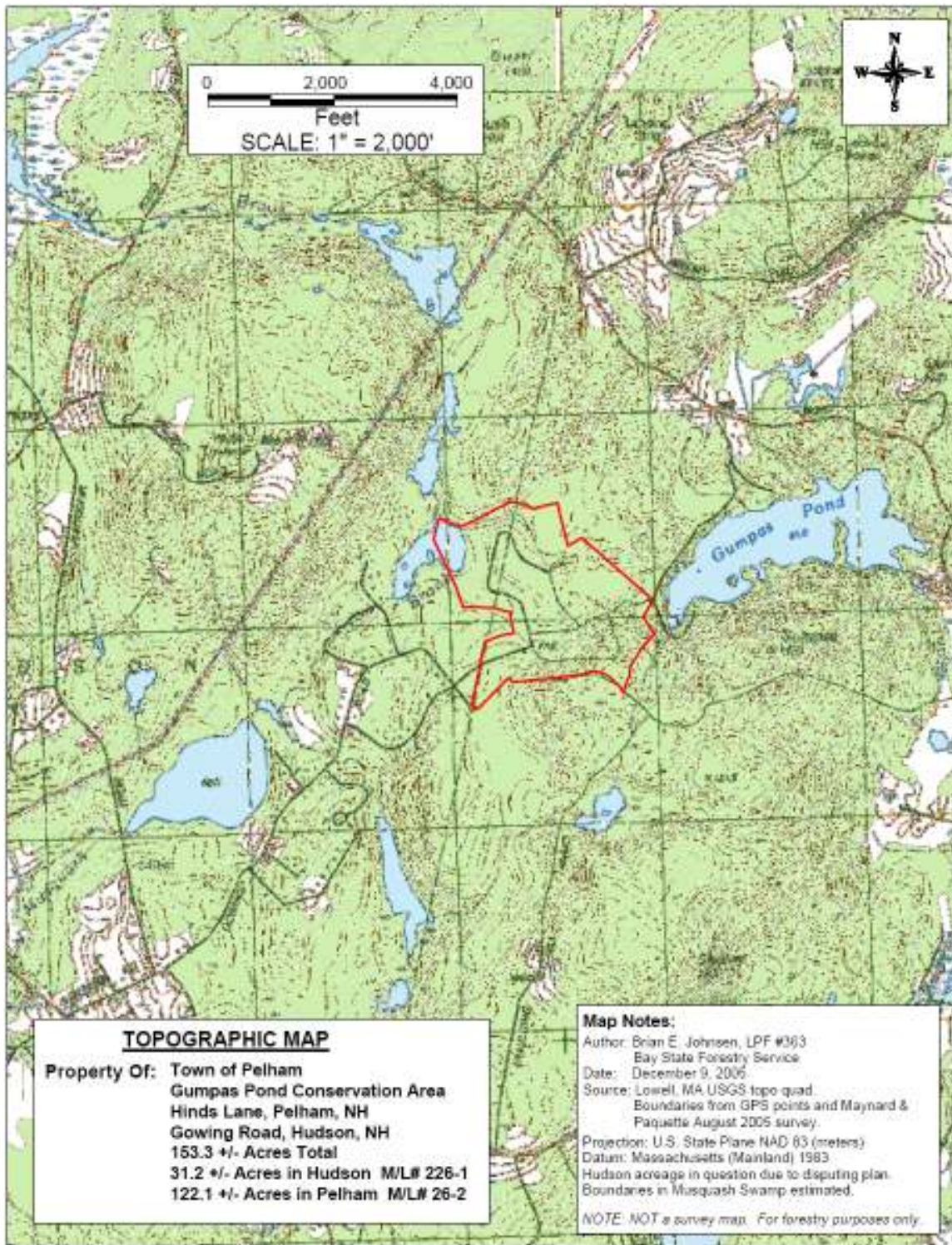
The Town of Pelham has been very proactive in protecting various areas around the town from development by keeping areas open for recreational use and

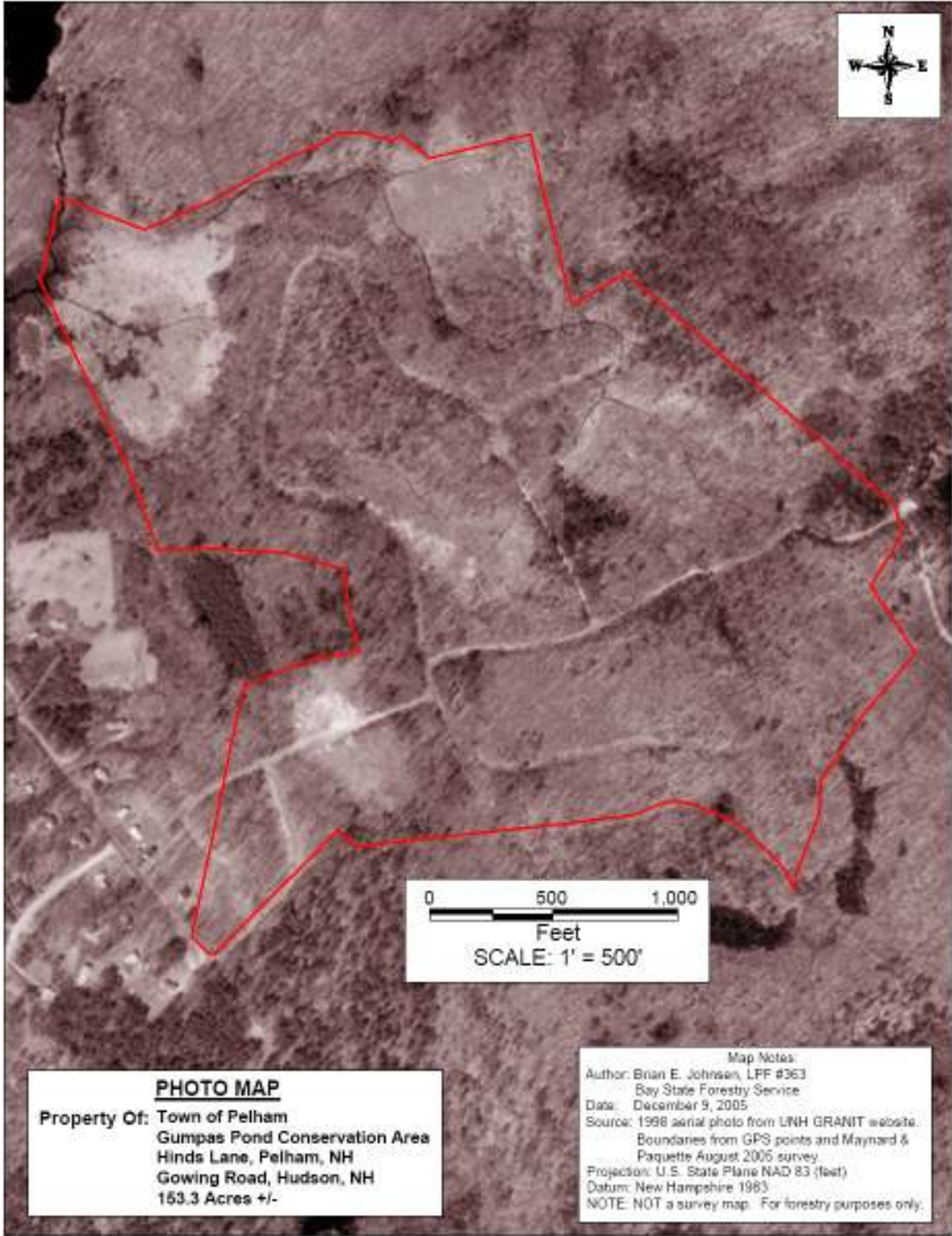
maintaining areas of forestland for wildlife habitat. Many of these parcels are associated with wetland areas that benefit greatly from the forested buffer they have instead of having pavement and lawns in the riparian zones. The Town continues to educate citizens and developers alike, explaining the benefits of forested lands around built-up areas. The general goals of the Town can best be summed up with the key words of the New Hampshire Tree Farm System, of which the Town is a member: wood, water, wildlife, and recreation. The Town is interested in managing their woodlots for long-term, sustainable forest management. They are interested in generating periodic revenue from timber harvests that encourage quality wood growth on residual trees as well as encourage regeneration, in order to grow tomorrow's forest beneath the forest of today. The Town owns many of their properties in order to protect sensitive wetland sites and waterways by maintaining a forested buffer between the open water and built-up areas. Because Pelham is a town with many people, the municipal officials recognize that families, individuals, and schoolchildren benefit from having wooded areas for walking and nature watching, as well as ballfields for playing sports. The Town hopes to keep these areas open to responsible recreation without compromising the other three goals. Finally, the Town recognizes that the native wildlife species of New Hampshire need areas for food, water, shelter, and raising young. To that end, these forests are kept as biologically diverse as possible while maintaining the other three goals as simultaneously as possible.

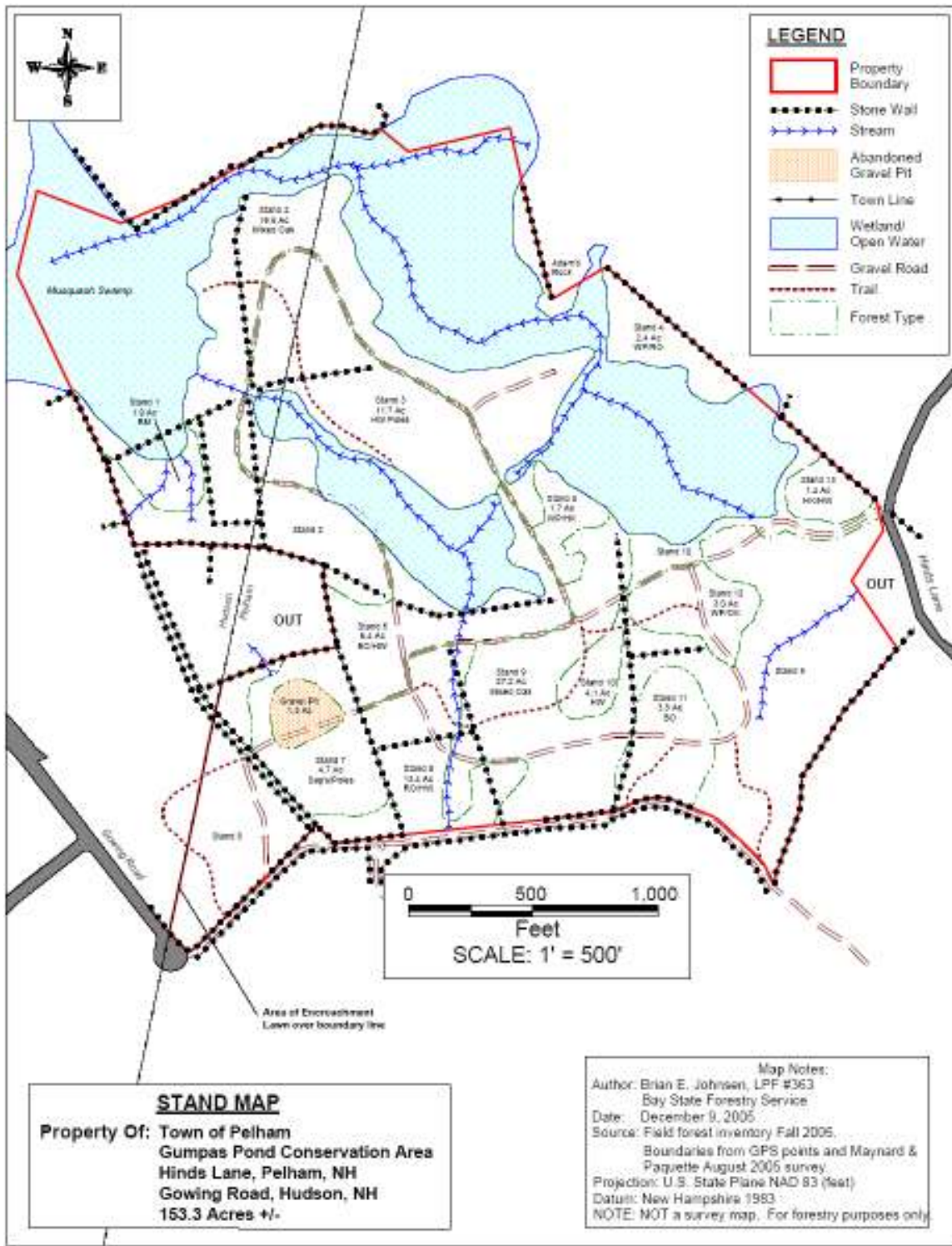
The goals for this specific property are to periodically thin the forest to gain some revenue over the years; maintain a trail system through the area for walking, biking, and non-motorized winter activities; maintain the integrity of the stream and wetland areas with no pollution, siltation, or alteration of the terrain; and provide a diversity of species with enough cover, food, and water so as not to lose species from living in this area of Pelham. Sound forest management will be able to meet most of these goals.

Additional action may need to be taken to prevent 4-wheelers from further degradation of the wetland areas. This may be as simple as asking users of the property to help build temporary wooden crossings to keep the machines out of the mud and water, and installing rubber waterbars on the steeper sections of trails. For areas (such as the mud holes in the middle of the gravel roads or gravel pit) that have ponded water with little wildlife value, filling in the mud holes should be considered. This will minimize the attraction by users that simply want to "go muddin'," which would do a lot to keep rogue riders out of wetland areas. This approach is probably better than simply posting signs that do not allow motorized vehicles on the property, since signs are generally ignored. Properly closing off the access at Gowing Road will likely help the situation a great deal, although it is obvious that trucks have even pulled away large boulders that were placed at this site a while ago. The upland areas of this property are not adversely affected by 4-wheelers, for the most part, and so the most important issues would be to keep the machines away from the wet areas.

In order to have a looping trail system that goes near Adam's Rock, a trail will most likely need to be built on the neighbor(s)' property to the east. Cooperation between landowners in a situation like this would be beneficial for the integrity of the wetlands.







General Management Strategies

Timber – One of the main goals for this property is sound timber management in order to produce a periodic income. A list of management strategies on a stand-by-stand basis is discussed later in this plan.

Fish/Wildlife Habitat – Although some activities can manage for a specific plant or animal (species specialists), most forest management activity focuses on habitat generalists by managing for a diversity of species, protecting existing critical habitat, and enhancing existing habitat. Keeping large browsers in mind, there will be some areas that are opened up to sunlight to encourage young growth on the forest floor.

Soil – Care will be taken to not harvest in mud season, when the ground is too soft, or on excessive slopes, to minimize rutting and erosion during harvest operations. Landings will be seeded with a conservation mix and limed at the conclusion of the job to stabilize the soil, and waterbars will be installed on skid trails where necessary. All these erosion controls will not prevent erosion, however, if OHRV's are not kept at bay. The Town will need to decide the best way the handle this situation.

Water Quality – Buffers will be left along streams and the wetland edge to avoid removing too many trees at once; this will provide soil stabilization along waterways and adequate shade. This shade will decrease water temperature and therefore increase the water's oxygen-holding capacity. The wetlands and streams will be left intact to keep the water clean and silt-free. Poled fords will be used when crossing smaller streams to further prevent siltation. Fueling of machines will not take place near the water's edge to prevent pollution. The crushed culvert on the western loop of the upper gravel road will be replaced. The rest of this gravel road to the south, where it meets with the general gravel road near the gravel pit, should be abandoned to the beaver pond.

Wetlands – In order to preserve the integrity of more sensitive areas of this woodlot, wetlands will only be harvested under dry or frozen conditions. Furthermore, some wetland areas that are currently accessed by OHRV trail will be blocked off from future access. The washout area near Stands 3 and 5, where the large and small wetlands meet, will be re-dressed so that vehicles are kept out of the water at that crossing area. Instead, a culvert and/or stone crossing will be used.

Recreational Resources – The skid trails will provide a nice network of trails for recreational opportunities, both for walking and wildlife viewing. To this end, trails will be kept free of slash where possible.

Aesthetic Values – To maintain good aesthetics, logging operations will not rut up the soils and will cut up the tops so they lay close to the ground for rapid decay. Logging crews will specifically leave high brush, rocks, and log barricades along trails that should be closed to OHRV's, but this will be an exception, following the landowner's goals to prevent erosion and maintain the integrity of sensitive wetlands.

Cultural Features – Care will be taken to avoid breaching or breaking the stone walls during timber harvests unless no openings exist to allow the trees to be skidded to the landing. To accomplish this, loggers will use existing barways for skidding.

Forest Protection – The diversity of tree species does well to protect this property from a forest pest looking for a monoculture of timber. By keeping logging slash low to the ground, decay is speeded up; this prevents too much of a buildup of fuels as a fire hazard.

Threatened/Endangered Species and Unique Natural Communities – During all the walks through this forestland, no species were identified as either threatened or endangered. If at some time any flora or fauna are identified on this property as such, appropriate measures will be taken to prevent disturbing that species.

Forest Management Plan

Stand 1 – Red Maple Swamp – 1.9 Acres

Description:

This stand, located in the northwestern corner of dry land in this property, is one of the stands located in Hudson, NH. This stand also makes up the majority of land involved in the boundary discrepancy between a 1979 survey and the deed for this parcel. The stand is comprised of wetland hardwood poles, mostly red maple, with an understory of hardwood shrubs, cattails, and herbaceous cover. The soils are quite wet, ponded most of the year, and very poorly drained. Two intermittent streams flow into this stand from the south and west. This stand provides an excellent filter for stream water and surface flow reaching Musquash Swamp and should remain intact.

Recommendations:

This stand is quite wet, has little in the way of timber resources to make harvesting appealing, and should be considered inaccessible for conventional harvesting purposes.

Stand 2 – Mixed Oak Sawtimber

Standing Volumes -- Stand 2		19.6 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Black Oak	46	4,831	94,688
Red Oak	15	1,756	34,418
Poplar	5	722	14,151
White Oak	4	439	8,604
Sawtimber Total:	70	7,748	151,861
		Cords/ac.	Total Cords
Cordwood	37	6.2	122
Softwood Pulp	7	1.4	27
Total BA/acre	114		

Description:

This rather large stand, located in the northern and western areas of the property south of the large wetlands, is composed mostly of black and red oak sawtimber 10-16" in diameter along with some smaller white oak and poplar sawtimber. Red maple, black birch, and white pine poles 6-10" in diameter, as well as the above-mentioned species, also add to the overstory composition. This stand has some decent white pine regeneration 5-15' tall, as well as red maple and other hardwood shrubs of similar size. Soils are rather rocky, somewhat well-drained or very well-drained, and the stand has already been cut over at least once before in the past 50 years. This stand is bounded by the old gravel road that was installed by the previous owners. This road provides very good access to this stand, although the road has been flooded in two places by beaver activity, at the southern ends of this stand.

Recommendations:

This stand, harvested sometime in the past 20 years, is actually growing fairly well and is not completely overstocked. However, the quality red oak sawtimber that is growing here could benefit greatly from a light harvest that removes the competing hardwood poles and poorly-formed large hardwoods. This thinning would remove about 20-30 square feet of basal area per acre, leaving a well-stocked stand of quality hardwoods to grow into the future. This harvest would remove about 15 MBF of oak sawtimber and at least 40 cords of firewood.

Stand 3 – Harvested Hardwood and White Pine Poles

Standing Volumes -- Stand 3		11.7 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Black Oak	17	1,273	14,894
White Pine	9	598	6,997
Red Oak	3	255	2,984
Sawtimber Total:	29	2,126	24,874
		Cords/ac.	Total Cords
Cordwood	36	6.8	80
Softwood Pulp	24	4.4	51
Total BA/acre	89		

Description:

This stand, located north of the small wetland and inside the upper loop of gravel road, is a high-and-dry area of dense hardwood and white pine poles 4-12” in diameter. Most of the white pine has been badly weeviled and is of very poor quality. This stand was harvested quite heavily during the last timber operation, and this stand has regenerated very well. The stand consists mostly of black oak and white pine 4-12” in diameter, along with some red oak, red maple, and white birch of similar size. Blueberry bushes make up the most common regeneration on the forest floor underneath the saplings and poles. The terrain is rather flat, generally sloping to the north or south with grades of 2-4%. A main ATV trail cuts through this stand, connecting the northwestern corner of the gravel road with the southeastern section just before the washout in Stand 2. The northwestern corner of this stand has been used a number of times as a camping area, with much trash and charred wood as evidence. Unless this area is monitored more closely against illegal camping, it is quite likely that a carelessly-left fire could start a wildland fire in this stand.

Recommendations:

This stand should be allowed to grow some more before attempting any sort of serious timber harvesting. However, this stand is at the perfect age for a timber stand improvement operation, called TSI. TSI is a manual operation of going through the woods with a chainsaw, felling or girdling poor-quality trees and releasing the high-quality neighbors. By reducing the competition for sunlight, water, and nutrients, the residual crop trees increase in diameter growth, thereby producing sawtimber sooner than if nature had self-thinned the pole growth.

Stand 4 – Well-stocked White Pine/Red Oak Sawtimber

Standing Volumes -- Stand 4		2.4 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
White Pine	56	8,675	20,820
Red Oak	43	3,509	8,422
White Oak	3	265	636
Yellow Birch	3	265	636
Black Oak	3	255	612
Sawtimber Total:	108	12,969	31,126
		Cords/ac.	Total Cords
Cordwood	16	5.3	13
Softwood Pulp	21	7.5	18
Total BA/acre	145		

Description:

This small stand, located along the northeastern boundary of the property, is composed of white pine and quality red oak sawtimber 12-18” in diameter, along with some mixed oak and yellow birch of similar size. Some smaller white birch and red maple can be found in this stand as well. This stand can be accessed through Stand 2, using an ATV trail and crossing the wetland area at one narrow point. The stand is somewhat dense and would benefit greatly from a thinning. Regeneration consists of good white pine, oak, and black birch saplings 2-8’ tall. Soils are well-drained and slope with grades of 2-5% to the west.

Recommendations:

As mentioned, this stand would benefit greatly from a light sawtimber harvest. Such a harvest should remove much of the suppressed hardwoods as well as a number of poor-quality white pines. This harvest would also remove some oak and white pine sawtimber, yielding about 10 MBF of sawtimber, mostly white pine.

Stand 5 – Dense White Pine/Hemlock Sawtimber

Standing Volumes -- Stand 5		1.7 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Hemlock	60	22,249	37,823
White Pine	50	8,603	14,625
Red Oak	60	5,783	9,831
White Oak	10	1,103	1,875
Sawtimber Total:	180	37,738	64,155
		Cords/ac.	Total Cords
Softwood Pulp	50	10.3	18
Total BA/acre	230		

Description:

This very small stand, located south of the eastern tip of Stand 2 between the two wetland areas, is a dense pocket of white pine, hemlock, and hardwood sawtimber 10-20" in diameter. This small stand appears to have been missed in the last harvest. The dense softwood overstory has shaded out most regeneration, and so the only regeneration found on the forest floor consists of hemlock saplings 5-15' tall. Soils are somewhat well-drained and fairly flat. Access to this stand is very good, using the gravel roads.

Recommendations:

This stand is overstocked and would benefit greatly from a sawtimber thinning. This harvest should remove about 10 MBF of hemlock, white pine, and oak sawtimber, focusing on removing more of the shady hemlock in order to establish some quality regeneration on the forest floor. Care should be taken to leave a few very large overstory white pines as perches for raptors.

Stand 6 – Black Oak/Hardwood Sawtimber & Poles

Standing Volumes -- Stand 6		6.4 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Black Oak	30	2,898	18,547
White Ash	10	1,369	8,762
White Pine	10	1,321	8,454
Red Oak	7	716	4,582
White Oak	7	613	3,923
Red Maple	3	255	1,632
Black Birch	3	265	1,696
Sawtimber Total:	70	7,437	47,597
		Cords/ac.	Total Cords
Cordwood	29	5.9	38
Softwood Pulp	3	0.8	5
Total BA/acre	102		

Description:

This large stand is located south of the small wetland and along the western boundary line, north of the gravel pit, and along the northern edge of the gravel road network. This stand is fairly similar to Stand 8 in a number of ways, but is distinctly different, as noted in the Stand Description for Stand 8. The stand is well-stocked, composed primarily of black oak sawtimber 12-16" in diameter, along with white ash, red oak, white oak, and black birch of similar size. Also found in this stand is a high pole component of red maple 6-10" in diameter as well as some white pine 14-18" in diameter. Regeneration consists of viburnum species and hardwood shrubs 3-6' tall, as well as pockets of good white pine regeneration 4-10' tall. Soils are somewhat well-drained and generally slope to the northeast with grades of 2-6%. Access to this stand is good, using the network of gravel roads and utilizing the gravel pit for a landing.

Recommendations:

This stand is fairly well-stocked as is, but the quality of sawtimber would benefit from a light thinning that would remove some of the poorly formed hardwoods and white pines. This thinning would remove some of the dominant black oak and white ash as well, in order to allow more sunlight to reach the younger, more vibrant pole stock. This harvest would yield 5-10 MBF of sawtimber as well as about 15 cords of firewood.

Stand 7 – Hardwood Saplings & Poles After Clearcut – 4.7 Acres

Description:

This small stand, located in the southwestern part of the property, south of the gravel pit, was clearcut in preparation to expand the gravel pit. The pit was never expanded, and this area has grown back in very well to red maple, gray birch, white birch, black birch, white pine, and red oak saplings. Soils are well-drained and slope very little. Access to this stand is very good.

Recommendations:

This stand is too young to prescribe any forestry treatments at this time, and should be monitored over the next 10 years for health and vigor. Towards the end of this 10-year management period, this stand should be evaluated for TSI potential in order to increase growth on crop trees and weed out poorly-formed stems.

Stand 8 – Harvested Red Oak & Hardwood Sawtimber

Standing Volumes -- Stand 8		13.4 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Oak	30	3,076	41,218
White Pine	15	2,190	29,346
White Ash	10	1,195	16,013
Black Oak	7	708	9,487
Black Birch	3	341	4,569
Hickory	3	294	3,940
Red Maple	2	194	2,600
White Oak	1	109	1,461
Sawtimber Total:	71	8,107	108,634
		Cords/ac.	Total Cords
Cordwood	53	9.6	129
Softwood Pulp	2	0.4	5
Total BA/acre	126		

Description:

This stand, located in the southeastern corner of the property, is quite similar to Stand 6 in a number of ways. Where Stand 6 is dominated by black oak, though, this stand is dominated by red oak sawtimber 10-16" in diameter. White pine stocking and size is similar, with slightly more sawtimber volume in this stand. White ash sawtimber stocking and volume is very similar, although this stand has a very high pole-sized stocking of white ash. Black birch sawtimber volume and stocking is similar, although the pole stocking is higher in this stand than in Stand 6. Red maple size and stocking is similar in both stands, with higher stocking of poles in Stand 6. White oak is nearly absent from this stand, as opposed to Stand 6. Soils in this stand are moderately well-drained and generally slope to the north and west, with grades of 3-6%. Access to this stand is very good. This stand appears to have been harvested more recently and more heavily than Stand 6, which may account for the higher pole stocking of white ash and black birch. Regeneration consists of some good pockets of white pine saplings 2-4' tall, as well as plenty of black birch saplings 10-20' tall. There are some areas that have some very good red maple, sugar maple, and black birch saplings 1-2" in diameter as well. It would appear that this stand has better soils for growing quality sawtimber, and it is likely that much of the standing white pine sawtimber was removed in the last harvest. Stand 6, on the other hand, never had much white pine sawtimber to begin with, and therefore was not as appealing to the previous harvesters.

Recommendations:

This stand is growing well after the last harvest, and regeneration is doing quite well. However, this stand would benefit from a light sawtimber harvest that would remove competing trees from around quality red oak crop trees. This harvest would remove about 10 MBF each of white pine and red oak sawtimber, about 5 MBF each of black oak and white ash, and more than 30 cords of firewood.

Stand 9 – Well-stocked Mixed Oak Sawtimber

Standing Volumes -- Stand 9		27.2 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Red Oak	46	3,933	106,978
Black Oak	28	1,781	48,443
White Pine	6	895	24,344
Red Maple	2	193	5,250
White Ash	1	94	2,557
White Oak	1	72	1,958
Sawtimber Total:	84	6,968	189,530
		Cords/ac.	Total Cords
Cordwood	39	11.2	305
Softwood Pulp	2	0.6	16
Total BA/acre	125		

Description:

This very large stand, making up the southern and southeastern portions of the property, is composed of a healthy stocking of red oak and black oak sawtimber 10-16” in diameter, as well as white pine and various hardwoods. This stand also has a full stocking of pole hardwoods 6-12” in diameter, particularly red oak, black oak, red maple, and white oak. Soils are generally moderately well-drained to well-drained, and range greatly in slope and aspect, although the general aspect of this stand is northerly. Regeneration varies a fair bit, but generally this stand has good stocking of white pine saplings 2-6’ tall on the forest floor. Access is good for most of this stand.

Recommendations:

This would benefit from a light harvest much like Stand 8, removing the competing pole-sized and sawtimber trees from around desired red oak and other quality crop trees. Such a harvest will yield at least 100 cords of firewood and 20 MBF of red oak and black oak sawtimber.

Stand 10 – White Birch & Hardwoods

Standing Volumes -- Stand 10		4.1 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
White Birch	30	2,822	11,570
Red Oak	10	1,029	4,219
Black Oak	10	1,029	4,219
Black Birch	10	764	3,132
Sawtimber Total:	60	5,644	23,140
		Cords/ac.	Total Cords
Cordwood	80	19.4	80
Total BA/acre	140		

Description:

This stand, located in the central-eastern area of the property, is primarily a white birch poles/small sawtimber stand along with mixed oaks, black birch, and other hardwoods of similar size. This small stand dips into Stand 9, and then is also found along the gravel road out to Hinds Lane and south of the extreme tip of the large wetland. Soils range from moderately well-drained (near Stand 9) to rather poorly-drained (near the wetland edge), and slope with grades of 3-8% to the south and west. Regeneration is sparse, with some hardwood shrubs and much less white pine than Stand 9. Access to this stand is good using the gravel roads. However, the northern edge of this stand forms the riparian zone around the southern edge of the large wetland, and should only be harvested under conditions that will not jeopardize the integrity of the wetland.

Recommendations:

This small stand would benefit from a light sawtimber and cordwood harvest in areas away from the wetland edge. This thinning should remove much of the dying white birch and competing, poor-quality black oak, leaving the healthier red oak and black birch as residual crop trees. This harvest will reduce the basal area just below 100 square feet per acre.

Stand 11 – Upland Stunted Black Oak

Standing Volumes -- Stand 11		3.8 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Black Oak	20	1,162	4,416
Sawtimber Total:	20	1,162	4,416
		Cords/ac.	Total Cords
Cordwood	70	16.3	61.9
Total BA/acre	90		

Description:

This small stand, located along the southern boundary line, is actually a subset of Stand 9. This stand has very dry soils, excessively drained, and rocky, with shallow soils and bedrock close to the surface. The red oak does not grow nearly as well here, and so this stand consists mostly of black oak stunted pole-sized trees growing over an understory of blueberries and hardwood saplings. This stand is accessible using the southern loop of gravel road.

Recommendations:

This small stand is currently understocked, and the shallow soils are not likely to grow excellent timber in the near future. This stand, then, should be used more as a travel-way between harvesting locations and should be addressed for sawtimber and cordwood removal in the next period. Some of the poorest-quality stems could be removed in the upcoming harvest for skid trail layout.

Stand 12 – White Pine & Oak Sawtimber

Standing Volumes -- Stand 12			3 Acres
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
White Pine	35	5,679	17,037
Red Oak	30	2,800	8,400
Black Oak	20	1,427	4,281
Sawtimber Total:	85	9,906	29,718
		Cords/ac.	Total Cords
Cordwood	35	9.6	29
Softwood Pulp	15	4.4	13
Total BA/acre	135		

Description:

This small stand, located south of the large wetland at the junction of diverging gravel roads, is comprised of white pine 10-16" in diameter along with mixed oak 8-14" in diameter. This stand could be considered a small pocket of white pine growing in Stand 9, but the concentration of white pine sawtimber has warranted its own stand. Otherwise, the soils and regeneration are the same: moderately well-drained, sloping north with grades of 4-8%, with areas of very good white pine regeneration 2-8' tall. Access to this stand is quite good.

Recommendations:

This small stand will benefit greatly from a timber harvest that will thin out some of the suppressed white pine poles and the low-quality black oak. Such a thinning will release the advance regeneration and increase the diameter growth rates on residual crop trees. This thinning will bring the basal area per acre down to about 90 square feet.

Stand 13 – Dense Hemlock/Hardwood Sawtimber

Standing Volumes -- Stand 13		1.4 Acres	
Species	Average BA/acre (sq. ft./ac.)	Volume per acre (bd. ft./ac.)	Total Volume (bd. ft.)
Hemlock	60	14,449	20,229
Red Oak	25	3,183	4,456
White Pine	10	1,509	2,113
Yellow Birch	10	382	535
Sawtimber Total:	105	19,523	27,332
		Cords/ac.	Total Cords
Cordwood	70	14.8	21
Softwood Pulp	30	5.7	8
Total BA/acre	205		

Description:

This small stand, located on the eastern boundary line near Hinds Road, consists of large hemlock sawtimber 12-20” in diameter along with red oak and white pine 8-14” in diameter. This stand also has some white and yellow birch pole stock 6-10” in diameter along with hemlock poles of similar size in the understory. Regeneration consists of some hemlock 4-10’ tall growing under the dense overstory. Soils are well-drained and slope to the west with grades of 6-15%. Access to this stand is fairly good off of the gravel road, although this stand is probably the furthest skid from the gravel pit landing area.

Recommendations:

This stand will benefit greatly from a sawtimber harvest that would remove much of the shady hemlock overstory to make room for the white pine and red oak poles to grow and mature into valuable sawtimber. This harvest will also allow sunlight to reach the forest floor, in order to establish some quality species for the future.

Management Schedule

2005

- Prepare the forest management plan.
- Blaze and paint identifiable boundary lines.
- Address recreational issues (hunting, hiking, ATV use, etc.).

2006-08

- Conduct a conventional timber harvest in harvestable areas.
- Seed and lime the landing at the conclusion of the timber harvest.

2006-15

- Monitor the woodlot for wind damage, ice damage, fire, or disease and take appropriate corrective actions as needed to ensure the continued health of this forest block.
- Address parking issues for trailheads, and trail creation and maintenance.
- Re-assess the woodlot in 10 years and write a new 10-year management plan, specifically looking at TSI potential and another harvest midway through the next management period.
- (Recommended Item) Make this property available for Project Learning Tree excursions for the local schools.

Concluding Remarks

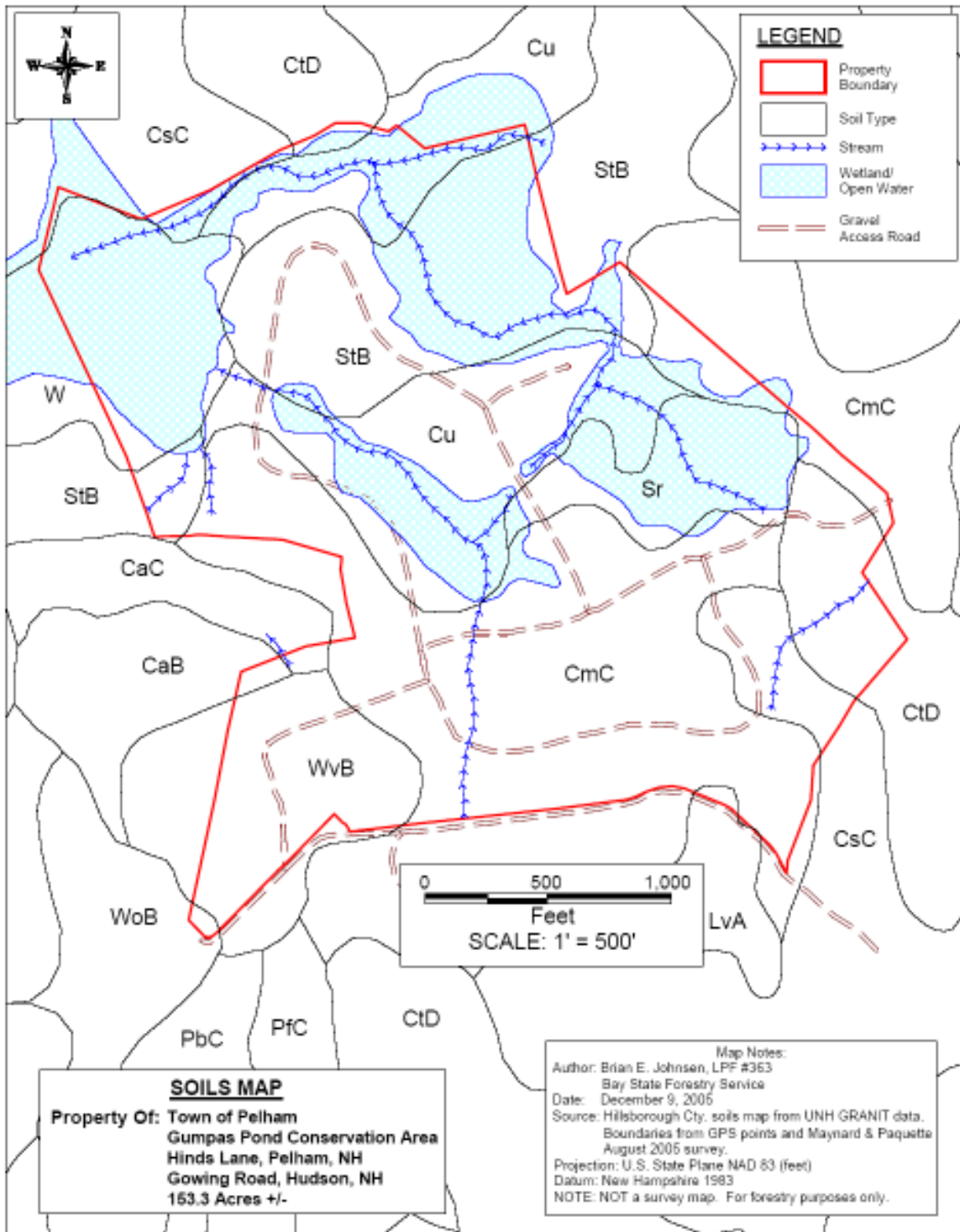
The recommendations proposed in this 10-year management plan should be implemented within the next 10 years, although timing will depend on landowner priorities, market conditions, and environmental conditions such as pest outbreaks and weather. Through sound silvicultural practices and using best management practices (BMP's), mature, diseased, and defective trees will be harvested to allow residual trees to grow in their place. This forest should be monitored for pest outbreaks and destructive weather events; corrective action should be taken as needed over the next 10 years in response to any such events. These recommendations are silviculturally and operationally sound and should result in meeting the landowners' objectives for their woodlot. Implementing these recommendations will help ensure that this forestland is being managed with long-term sustainability in mind.

Respectfully Submitted,

Brian E. Johnsen, Consulting Forester
N.H. License #363

Appendix A.

SOILS INFORMATION



Hillsborough County Soils Profiles

CaB – Canton fine sandy loam, 3-8%

Suitability for growing wetland plants for wildlife habitat – Poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Good.
Suitable for trails & paths.
Has a good site index (greater than 60) for red pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, moderately rapid permeability, well-suited for cropland, low productivity as forestland.

CaC – Canton fine sandy loam, 8-15%

Suitability for growing wetland plants for wildlife habitat – Poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Good.
Suitable for trails & paths.
Has a good site index (greater than 60) for red pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, moderately rapid permeability, well-suited for cropland, low productivity as forestland.

CmC – Canton stony fine sandy loam, 8-15% slopes

Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Poor.
Has a good site index (greater than 60) for red pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, moderate permeability, low productivity as forestland, steep slopes can limit logging.

CsC – Chatfield-Hollis complex, 8-15% slopes

Suitability for growing wetland plants for wildlife habitat – Poor.
Suitability for growing coniferous and hardwood trees – Fair.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Fair.
Suitability for area as habitat for openland wildlife – Good.
Has a good site index (greater than 60) for sugar maple, white ash, red oak, white pine.
Has only slight erosion hazard and slight windthrow hazard.
Well-drained, granite bedrock within 2', high permeability, high drought susceptibility, moderately productive as forestland.

CtD – Chatfield-Hollis-Rock outcrop complex, 15-35% slopes

Suitability for growing wetland plants for wildlife habitat – Very poor.
Suitability for growing coniferous and hardwood trees – Fair.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Fair.
Suitability for area as habitat for openland wildlife – Poor.
Has a good site index (greater than 60) for sugar maple, white ash, red oak.

Has only slight erosion hazard and slight windthrow hazard.
Excessively-drained, granite bedrock at 1-2', moderately permeable, low productivity as forestland, steep slopes and exposed rock outcrops limit logging.

Cu – Chocorua mucky peat

Suitability for growing wetland plants for wildlife habitat – Good.
Suitability for growing coniferous and hardwood trees –Very poor.
Suitability for area as habitat for wetland wildlife – Good.
Suitability for area as habitat for woodland wildlife – Very poor.
Poor suitability for trails, high windthrow hazard.
Very poorly-drained, thick organic layer, moderately permeable, high water table, generally grows shrubs or red maple.

LvA – Leicester-Walpole complex stony, 0-3% slopes

Suitability for growing wetland plants for wildlife habitat – Good.
Suitability for growing coniferous plants – Fair.
Suitability for area as habitat for wetland wildlife – Good.
Suitability for area as habitat for woodland wildlife – Fair.
Has a good site index (greater than 60) for eastern white pine and red maple.
Has only slight erosion hazard and severe windthrow hazard.
Often poorly drained, seasonal high water table limits tree species and operability.

Sr – Scarboro stony mucky loamy sand

Suitability for growing wetland plants for wildlife habitat – Good.
Suitability for growing coniferous and hardwood trees –Poor.
Suitability for area as habitat for wetland wildlife – Fair.
Suitability for area as habitat for woodland wildlife – Poor.
Poor suitability for trails, high windthrow hazard.
Very poorly drained, rapid permeability, high water table, low productivity as forestland, high water table limits most logging, can grow eastern white cedar and red maple.

StB – Scituate stony fine sandy loam, 3-8% slopes

Suitability for growing wetland plants for wildlife habitat – Poor.
Suitability for growing coniferous and hardwood trees – Good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Poor.
Trails & paths moderately restricted due to wetness.
Has a good site index (greater than 60) for red pine, white pine, red oak.
Has only slight erosion hazard and slight windthrow hazard.
Moderately well-drained, hardpan at 2' limits permeability and rooting depth, often has a perched high water table, moderate productivity as forestland.

WoB – Woodbridge loam, 3-8% slopes

Suitability for growing wetland plants for wildlife habitat – Poor.
Suitability for growing coniferous and hardwood trees – Fair, good.
Suitability for area as habitat for wetland wildlife – Very poor.
Suitability for area as habitat for woodland wildlife – Good.
Suitability for area as habitat for openland wildlife – Good.
Trails & paths moderately restricted due to wetness.
Has a good site index (greater than 60) for red pine, white pine, red oak, sugar maple.
Has only slight erosion hazard and slight windthrow hazard.
Moderately well-drained, hardpan at 2' limits permeability and rooting depth, often has a perched high water table, moderately-high productivity as forestland.

WvB – Woodbridge stony loam, 3-8% slopes

Suitability for growing wetland plants for wildlife habitat – Poor.

Suitability for growing coniferous and hardwood trees – Fair, good.

Suitability for area as habitat for wetland wildlife – Very poor.

Suitability for area as habitat for woodland wildlife – Good.

Suitability for area as habitat for openland wildlife – Poor.

Trails & paths moderately restricted due to wetness.

Has a good site index (greater than 60) for red pine, white pine, red oak, sugar maple.

Has only slight erosion hazard and slight windthrow hazard.

Moderately well-drained, hardpan at 2' limits permeability and rooting depth, often has a perched high water table, high productivity as forestland.