

Carroll County Farm and Forest Forest Stewardship Plan

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Carroll County Farm and Forest Forest Stewardship Plan

The creation of a forest stewardship plan for a tract of land is a crucial step in the management of this resource so that the property can achieve all the stated landowner goals and objectives that are outlined by the landowner or the governing body responsible for the ownership. The plan provides a detailed blueprint of the property in which all the amenities including timber resources, water and wetland resources, soil types, wildlife features, aesthetic qualities, forest recreation opportunities, forest protection issues, rare and endangered animal and plant species identification, the presence of exemplary natural communities and the identification of historic, cultural and archeological sites are both mapped and discussed in the report. The plan is intended to cover a ten year period at which time, the property should be re-inventoried, the map revised and the management recommendations reviewed and adjusted as necessary.

The development of a management plan goes through a number of stages which include:

1. Completion of the Landowner Goals and Objectives questionnaire. (Appendix A)
2. Design of the cruise map in order to map the property and inventory the timber resources. (Appendix B for cruise line and sample point locations)
3. Cruise the forest on a desired grid in order to obtain the information at the desired level of accuracy.
4. Write the plan, draft the map and analyze the timber inventory data using the appropriate computer program.
5. Present the plan to the landowner and review the recommendations for the management of the acreage.

Cruising the Property

The crucial step in the preparation of a stewardship plan is the collection of the field data. Foresters use the term cruise to designate the procedure of information gathering in the field. In this project, I determined that a cruise on a grid spacing of 400 feet between parallel cruise lines with points taken 400 feet apart on each cruise line would provide adequate information to accurately map and inventory all the resources on this property. This design would also provide an accurate assessment of the timber resources growing on this land by tree species, diameter size and by forest product i.e. sawlog, firewood/pulpwood, and biomass fuelwood. The total acreage of the ownership is approximately 886 acres. My grid spacing ensured that a sample was taken approximately every 4 acres in order to inventory this property. (Appendix B for maps showing location of cruise lines and points) Thus, approximately 200 sample points were taken throughout the acreage. The Point Sampling Method of Measuring Forest Statistics has become the standard for obtaining a forest inventory since its development in 1948.

The tallying of the basal area at the sample point makes use of a wedge shaped prism. Sighting through the prism, the trees whose stem sections at breast height (4.5 feet off the ground) do not appear detached from the main stem are counted. The tree count is used to develop the basal area or square footage of wood growing on that acre. There is a correlation between tree basal area and tree volumes. Therefore, timber volume estimates by product may

be obtained when the tallied trees are converted to Board Feet of sawlogs and Cords of pulpwood in their merchantable height.

Analysis of the Data

The data collected falls into several categories: species, diameter, level, number of 8' bolts that are classified into sawlog, pulpwood, veneer log, pallet log, box log or cull quality. After the cruise is complete, the tally cards for each point are segregated by forest types as determined through the mapping. All data is entered by forest type for processing by a computer program called FOREST TALLY. This program, the original of which was called INVENT and was developed at the University of New Hampshire by David S. Linden, compiles the various categories of data to determine the sawlog and pulpwood volumes by species within each compartment as well as for the entire tract.

Drafting the Map

The map, which is compiled during this cruising exercise, is critical to the plan since it identifies the location and boundaries of all the forest types that are depicted on this acreage as well as all the other significant features of the property. This visual picture of the property complements the written document. Adjustments of approximate boundaries of the forest types were based upon the 7/21/1999 and the 8/4/2000 colored infrared aerial photographs at a scale of 1"= 400'

Writing the Plan

The written plan describes all the features of the property. The critical forest management information is provided in the written description and prescriptions for each forest type. These sections outline the recommendations on what to do, how to do it and when to do it with respect to the management of these areas of the property. A key page in the report is the Schedule of Priorities which summarizes what to do, where to do it and the time frame in which to accomplish the recommendations. The Schedule of Priorities, when used in conjunction with the forest type map, provides a visual picture of where the work is to be performed.

Plan Presentation and Implementation

The forester meets with the landowner to review the highlights of the plan. He focuses on the Schedule of Priorities while referencing the map so that the landowner can formulate a picture of where the work is to be performed. Naturally, the forester hopes that the landowner will give permission to begin the implementation phase of the management plan. The landowner relies on the forester to determine the best time to conduct the recommendations while taking advantage of ideal market opportunities and appropriate weather conditions as well as protecting the land from any undesirable impact from the recommended management activities.

Goals and Objectives

The County Commissioners were given a copy of a Landowner Goal and Assessment Form and requested to fill this detailed questionnaire out in order to articulate the goals and objectives for the County Farm property. A copy of this completed document is included in this report (Appendix A). A summary of the stated key goals and objectives and their level of importance as reported by David Sorensen, current Chairman of the Carroll County Commissioners in 2006, for this acreage are as follows:

Its importance to the Commissioners

<i>Goals/ Uses</i>	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>None</i>
Income	X			
Recreation		X		
Scenic Beauty	X			
Wood Products	X			
Wildlife		X		

History of Ownership and Forestry Activities

Lillian Brooks, Carroll County Registrar of Deeds, has prepared a detailed listing of the land acquisitions which comprise the Carroll County ownership. This, to my knowledge, has not been compiled into a final report. Lillian has supplied copies of the deeds that comprise this ownership. (Appendix C for copies of these transactions).

The earliest map of this acreage, which I was able to uncover, was a plan prepared in August of 1942 by George Stenzel, the first UNH Carroll County Extension Forester. (Appendix D) George prepared a Sustained Yield Management Plan for the Carroll County Farm. At that time, he determined the total acreage to be about 594 acres. This was broken down into 363.9 acres of woodland and 230.1 acres of field and pasture. This map was not a formal survey but accurately depicted the exterior boundaries as well as the forest stands, many of the stone walls and wire fences, woods roads and wetlands comprising this acreage. This map served as a management guide for this acreage and was used by George's successors including Ted Breon County Forester from 1948 until 1960, Arthur Gibb Dodge who served in this role from 1960 until 1970 and Peter Pohl from 1970 to the present. In 1979, Peter prepared a revised management plan (Appendix E) This has served as a guide until now. Peter's retirement will take effect in September of 2006, thus the necessity to prepare a revised management plan to assist his replacement in the management of this important county asset.

In 1962, Stephen H. Boomer, land surveyor, prepared a survey of the County acreage (Appendix F) This plan was recorded at the Registry of Deeds on June 5, 1973. The external boundaries of this map generally agree with the 1942 map prepared by Stenzel. Boomers acreage calculations differed from Stenzels. The total acreage, as determined by the Boomer survey, was 705 acres, a significant difference from the Stenzel map. When Peter Pohl checked the acreage calculations listed on the Boomer survey, he detected a sizeable discrepancy in the area of the property located between Route 28 and Route 171. The Boomer survey indicated 430 acres while Peter's acreage calculation revealed approximately 493 acres. He used two different methods to check his calculations and they verified the finding. When he totaled the area of all the hay fields, overgrown fields, wetlands and forest types, this total figure also closely equaled the revised acreage figure for this area of the property.

In 1975, the County acquired an additional 117+ or - acres which abutted the County property in the northwest. This acreage was owned by Fred Bickford of Sandwich who had acquired it from the New England Box Company. The Bickfords owned it for a relatively short period of time. They conducted a modest timber sale over most of the acreage and then sold it to the county.

The current map (Appendix G) prepared from the Boomer survey with the additional acreage acquired from the Bickfords has been plotted on the 7/21/1999 and the 8/4/2000 colored infrared aerial photographs. An aerial photo mosaic showing the boundaries of the County land has been prepared and framed and presented to the County Commissioners at the time of this detailed report. These photos are at a scale of 1"=400' and reflect both the scale of the Boomer survey as well as the grid spacing used by Peter Pohl in the cruise of this acreage. The colored photos, coupled with the field cruise information, have allowed for delineation of the major timber types, the current size and location of the wetlands, the boundaries between the fields and the forest land, location of stone walls, wire fences, roads, streams and cultural and historic features such as cellar holes and cemeteries.

The forest management activities on this acreage have been extensive. The majority of this harvest activity has occurred in Compartment II. Some firewood and sawlog harvesting has occurred in both Compartments I and III. Unfortunately, detailed and accurate records were not kept in the early period from 1942 until about 1963. The following summarizes the major activities and volumes of forest products harvested. Figures are approximate and or best guesstimates. (Appendix H for map showing location of some of these sales).

Timber Harvest Activities

<i>year</i>	<i>sawtimber & pulp volume</i>	<i>revenue</i>
1963	131,275 bf	\$2,680.00 (\$20 mbf)
1970-1972	585,974 bf	\$18,516.00 (\$31.60 mbf)
1973-1978	76,000 bf	Custom sawn for own use.
1988	50,000 bf	Custom sawn traded lumber.
1988-1989	30-40,000 bf	Harvested by Whittier Lumber Company.
1993-1994	303,740 bf 1,201 tons pulp	\$58,162.40
1995-2004	25-30,000 bf 250+ cords firewood	Harvested in exchange for cutting & yard firewood. Jim Eldridge did the work.
2005	214,000 bf 211 tons pulp 3283 tons biomass 213 cords firewood	\$46,766.53 -\$6,640 to cut & yard firewood = \$40,126.53
1970-2004	125 cords firewood / year	4037 cords * \$100.00/cord average = \$403,700.00

Thus between the period 1963 and 2005 an approximate volume of 1,431,000 board feet of lumber, 1412 tons of pulp and 3283 tons of biomass were harvested representing \$123,485 of revenue generated from the above sales.

In addition, the 1979 timber cruise and subsequent management plan prepared by Peter Pohl established a suggested average annual harvest of about 125-130 cords of firewood for sale by the County Farm. From 1970 to 2004, using an annual harvest of 125 cords, the total firewood production has equaled approximately 4037 cords valued at an average of about \$100 per cord over that time period for a total of \$403,700. Thus an approximate dollar income generated during the past 42 years from the management of these county lands is in excess of \$527,000. This figure is conservative since the County farm has marketed firewood longer than this 42 year period. Records are non-existent prior to 1963 and the firewood records are calculated from 1970.

What has been reinforced, as a result of the recent intensive cruise of this acreage, is that despite the extensive timber harvesting that has taken place over the past 42 years, the forest land is either well or overstocked with merchantable forest products and that this acreage will continue to be a sustainable source of a multitude of forest products including sawtimber, pulpwood, biomass fuelwood chips and firewood in perpetuity, if the principles of sustainable management are adhered to.

Traditionally, the County Forester has been very involved in the layout of the commercial timber sales conducted on this acreage. In the 1970 timber sale sold to Deprizios from Middleton, New Hampshire, Gibb Dodge and Peter Pohl marked the sale. Stan Coville from the New England Forestry Foundation was hired to sell and supervise the operation. The 1993-1994 timber harvest was marked, sold and supervised by Peter Pohl. Steve Leighton of Leighton Logging, of Center Strafford, New Hampshire was the high bidder. The most recent sale in 2005, was purchased by Taylor and Sons of Porter, Maine. Again, this sale was marked, sold and supervised by Peter Pohl.

In addition to the timber sales, the county forester has worked closely with Alan Sequin, the current farm manager, to plan and lay out annual firewood harvests in various locations throughout the property. In some instances, Alan has used his discretion in selecting locations to harvest firewood and in making the choices of what to cut. In the future, I suggest all timber harvest activity, regardless of size, be jointly reviewed and decided by both the County Extension Forester and the County Farm Manager. **Trees to be harvested should be marked by the County Forester.**



2005 timber sale conducted by Dennis Taylor of Porter, Maine
photo taken Spring 2006

Location of Property

This property is located in the Town of Ossipee. The acreage is in three distinct areas divided by two major state highways. The southern most portion of the property, identified as Compartment # I, is located south of Route 28 and consists of two triangular shaped parcels that contain 36 and 18.3 acres respectively. The 36 acre parcel borders the Ossipee / Wolfeboro town line.

Compartment # II, totaling approximately 493 acres, represents the largest piece of the property and extends northeast of the Ossipee / Wolfeboro town line and is located between Route 28 and Route 171. It includes the majority of the County Complex including the Administration Building, the County Jail, the County Nursing Home and the County Maintenance and Farm Buildings.

Compartment # III is the land to the north of Route 171 and contains approximately 339 acres. This property contains the new Carroll County Superior Court Building, the water pumping facilities and a cell tower.

Topography and Aspect

The topography is variable. In Compartment # I, the 36 acre parcel slopes towards the north and northeast and then levels off. The 18.3 acre tract is level to eastern sloping. In Compartment # II, there is a steep slope which extends northeast of the town line and parallels Route 28 for some distance before leveling out to some extent. This slope levels off and is modest to level throughout much of this compartment. A steep embankment extends along the brook which exits out of the beaver pond at the site of the old dump and winds its way to Route 28 crossing near the southeast corner of Compartment #II. The area bordering the town line slopes in a northeasterly direction. In Compartment # III, the land starts out quite level and gets moderately steep in the northeast section of the property before leveling off on the height of land located on the former Bickford land. (Appendix I)

Access

Access to this property is excellent. The property has significant frontage along Route 28 and Route 171. Timber harvesting activity has resulted in landings that are located off Route 28. In the case of Compartment # I, an access road paralleling the southern boundary of the 36 acre parcel leads to an existing landing site about half way up this boundary line. This landing is on the abutting parcel which had been logged. The county received permission to yard firewood and logs into this landing during the 2004 timber harvest operation. Landings could be created off of Route 28 for both of these tracts. The total frontage on Route 28 for the Compartment # I parcel is 2800 feet.

Compartment # II has approximately 3300 feet of frontage along Route 28 and about 2400 feet along Route 171. Two landing areas have been constructed on Route 28 that are used to yard any wood harvested south of the brook and wetlands in this area. An interior road system extends from the county complex through the field and past the old dump and beaver pond. Just past the pond, this road forms a Y. The right hand fork extends all the way up to the hayfield bordering the northwestern boundary of the property. The left hand fork meanders out into the

center of this compartment and extends within about 1200 feet of the Ossipee / Wolfeboro town line. A landing area in the field adjacent to Route 171 and located opposite the woods road leading up through Compartment # III to the spring has been used when harvesting timber from this area of the property. A road leading from Route 171 up into the pasture bordering the northwestern boundary of Compartment # II provides access to the western portion of this compartment. The edge of this pasture can be used as a landing area for proposed harvest operations in this area of the property.

Compartment # III has an existing road which extends from Route 171 and goes just past the well house and up to the cell tower. An existing but overgrown woods road lined by stone walls extends up into the parcel acquired from the Bickford's. This road, which begins at the entrance to the field, can be reopened without a great deal of effort and utilized at the appropriate season of the year to harvest wood from the entire western half of this compartment. A woods road should be constructed to gain access into the northeastern section of the property. This road would begin just past the firewood landing beyond the well house. This area of the property contains some of the most challenging terrain and it suffered the most severe ice damage in the January 1998 ice storm of anywhere on the property. The volume of timber to be removed can justify the construction of an access road into this section of the property. (Appendix G for the location of landing areas mentioned in the above description).

Soils

Soils are a critical feature of a tract of land that determines the productive capability of this acreage with respect to growing trees and agricultural crops. According to the Soil Survey of Carroll County, New Hampshire published in 1977 by the United States Department of Agriculture Soil Conservation Service and Forest Service in cooperation with the New Hampshire Agricultural Experiment Station, six major soil types cover the County Farm property. (Appendix J soils maps)

The most prevalent soil type is the Gloucester series. This very stony fine sandy loam ranges in slope from 3 to 25% and is located in both the northern third of Compartment # II and the northern half of Compartment # III. The next most prevalent soil type appears to be the Millis series. These soils are very stony fine sandy loams ranging in slope from 3 - 15%. The next important series is the Paxton series which is a very stony fine sandy loam ranging in slope from 0 to 15%. These soils occupy a portion of the open field land in Compartment # II and the field surrounding the Court House in Compartment # III. The Woodbridge series is the next important soil type and is classified as a fine sandy loam ranging in slope from 3 - 8%. This soil type occupies a portion of the field and an area adjacent to the beaver pond near the old dump in Compartment # II and a small area in Compartment # III. Ridgebury very stony fine sandy loam is located in a small area in Compartment # III. It ranges in slope from 0 - 3%. Lastly, Charlton very stony fine sandy loam ranging in slope from 3-8% is located in Compartment # III on Thompson Hill.

Soils are grouped into one of five groups. Factors considered in the placement of soil mapping units in groups include: 1. Soil productivity (site index data), 2. Management considerations and 3. Kinds of tree species generally found in successional stands and "climax" stands. The soil groups are as follows: I A, I B, I C, II A, II B.

Group I A

This group consists of the deeper, loamy textured, moderately well and well drained soils. Generally, these soils are more fertile and have the most favorable soil moisture relationships.

The successional trends on these soils are toward stands of shade tolerant hardwoods i.e. beech and sugar maple. Successional stands frequently contain a variety of hardwoods such as beech, sugar maple, red maple, white birch, yellow birch, aspen, white ash and northern red oak in varying combination with red and white spruce, balsam fir, hemlock and occasionally white pine

Hardwood competition is severe on these soils. Softwood regeneration is usually dependent upon persistent hardwood control efforts. The soils on the County Farm which fall into this group include: Millis, Woodbridge, Paxton and Charlton.

Group I B

The soils in this group are generally sandy or loamy over sandy textures and slightly less fertile than those in Group I A. These soils are moderately well and well drained. Soil moisture is adequate for good tree growth, but may not be as abundant as in Group I A soils.

Soils in this group have successional trends toward a climax of tolerant hardwoods, predominately beech. Successional stands, especially those which are heavily cut over, are commonly composed of a variety of hardwood species such as red maple, aspen, paper birch, yellow birch, sugar maple and beech, in combination with red spruce, balsam fir and hemlock.

Hardwood competition is moderate to severe on these soils. Successional softwood regeneration is dependent upon hardwood control. The soils on the County Farm which fall into this group include: Gloucester

Group I C

The soils in this group are outwash sands and gravels. Soil drainage is somewhat excessively to excessively drained and moderately well drained. Soil moisture is adequate for good softwood growth, but is limited for hardwoods. These soils are ideally suited for the growth of white pine. There were no soils on the County Farm which fell into this group

Group II A

This diverse group includes many of the same soils as in groups I A and I B. However, these mapping units have been separated because of physical limitations which make forest management more difficult and costly, i.e., steep slopes, bedrock outcrops, erosive textures, surface boulders and excessive rockiness. The Gloucester series with the very stony 15-25% slope soils fall into this group.

Group II B

The soils in this group are poorly drained. The seasonal high water table is generally within 12 inches of the surface.

Productivity of these poorly drained soils is generally less than soils in other groups.

Successional trends are toward climax stands of shade tolerant softwoods, i.e. spruce and hemlock. Red maple is common on these soils. Balsam fir is a persistent component in stands in northern New Hampshire.

Due to abundant natural reproduction in northern New Hampshire, these soils are generally desirable for production of spruce and balsam fir, especially pulpwood. Red maple cordwood stands or slow-growing hemlock sawtimber are common. However, due to poor soil drainage, forest management is somewhat limited. Severe windthrow hazard limits partial cutting and harvesting is generally restricted to periods of extreme drought or frozen ground conditions.

The soils on the county farm which fall into this category are the Ridgebury soils.
The following is a list of the 6 soils that underlay the County Farm Property.
(A description of each soil type is found in Appendix J.)

Soil Types

group	symbol	description
IA	CIB	Charlton very stony fine sandy loam, 3-8% slopes
IA	PaB	Paxton very stony fine sandy loam, 0-8% slopes
IA	PdB	Paxton very stony fine sandy loam, 3-8% slopes
IA	PaC	Paxton fine sandy loam, 8-15% slopes
IA	MsB	Millis very stony fine sandy loam, 3-8% slopes
IA	MIB	Millis fine sandy loam, 3-8% slopes
IA	MsC	Millis very stony fine sandy loam, 8-15% slopes
IA	WoB	Woodbridge fine sandy loam, 3-8% slopes
IA	WvB	Woodbridge very stony fine sandy loam, 3-8% slopes
IB	GsB	Gloucester very stony fine sandy loam, 3-8% slopes
IB	GIB	Gloucester fine sandy loam, 3-8% slopes
IB	GsC	Gloucester very stony fine sandy loam, 8-15% slopes
IIA	GsD	Gloucester very stony fine sandy loam, 15-25% slopes
IIB	RIA	Ridgebury very stony fine sandy loam, 0-3% slopes

Forest Categorization

There are a number of ways a forester can categorize woodland. The most common way is to divide the property into logical compartments. In the case of the County Farm acreage, we first have the whole property defined by the property survey. Next are the compartments which are identified by their geographic location. Three distinct compartments divided by roads defined these units. The final category is the division of the compartments into stands—areas of the forest with similar characteristics (i.e. species composition, size class, and density or stocking level). These similar stands can then, based upon their similar characteristics, be treated in a uniform manner.

For ease of reference, these stands are given a numerical label (Stand 1, 2, 3 etc...). Stands are then given a short coded description on the Forest Type Map which provides the user a brief description of the stand. This coded description deals primarily with the dominant trees that comprise the over story and includes the following categories that best describes the stand.

Forest Stand Types

species type	size class	stocking level
Hdw: Hardwood	1: Saplings (1-3")	A: Over stocked
Mixed: Mixed Wood	2: Poles (4-7")	B: Fully stocked
Sfw: Softwood	3: Sawtimber (8"+)	C: Under stocked
WP: White pine		

For example, H2A would indicate a stand that is made up of primarily hardwood species that is over stocked with pole size trees, M3C would be an under stocked sawtimber size forest of mixed wood including both softwood and hardwood, or WP1B would be a fully stocked white pine sapling stand. If information regarding the understory were desired in the stand descriptions it would be recorded as WP3C/H1A, in this case an under stocked white pine sawtimber overstory stand with an over stocked understory of hardwood saplings. In the case of the County Farm property, the following six forest stand types were identified: (Appendix G Forest Type Map)

County Farm Forest Stand Types

number	forest stand type	description
1	WP	Predominantly white pine with some scattered hardwood and hemlock
2	Mixed Hdw	Predominantly red oak, red maple, beech and lesser amounts of sugar maple, white and yellow birch, white ash, scattered hemlock and white pine with possible inclusions of either one or both of these species
3	Hm/ WP/ Hdw	Predominantly hemlock with scattered or small inclusions of white pine and mixed hardwood throughout
4	WP/Hm/Hdw	Predominantly white pine with scattered or small inclusions of hemlock and mixed hardwood throughout
5	Sfw/Hdw	This area consists of a mix of all species of softwood and hardwood but the softwood dominates
6	Hdw/Sfw	This area consists of a mix of all species of hardwood and softwood but the hardwood dominates

The following table lists the forest stand types and fields with the total acreage in that category listed by compartments:

Forest Stand Types & Fields

compartment	stand type	acreage	field	acreage
I 36 acre lot	Mixed Hdw	10		
	Hm/WP/Hdw	26		
18 acre lot	Mixed Hdw	2		
	Mixed Hdw/Sfw	16		
II	WP	30	#1	5.7
	Mixed Hdw	24	#2	2.5
	Hm/WP/Hdw	62	#3	11.7
	WP/Hm/Hdw	115	#4	5.2
	Hdw/Sfw	106	#5	1.7
	Sfw/Hdw	46	#6	1.7
			#7	.6
			#8	10.0
			#9	17.0
			#10	6.7
III	WP	36	#1	4.0
	Mixed Hdw	35	#2	5.5
	Hm/WP/Hdw	16	#3	2.5
	WP/Hm/Hdw	92		
	Hdw/Sfw	123		
	Sfw/Hdw	16		
Totals		755		90

Abbreviations Used for Tree Species

BC	Black Cherry	RP	Red Pine
Be	Beech	SM	Sugar Maple
Bw	Basswood	Sp	Spruce
HH	Hop Hornbeam	WA	White Ash
Hm	Hemlock	WB	White Birch
RM	Red Maple	WP	White Pine
RO	Red Oak	YB	Yellow Birch

Stand Technical Data and Recommendations

This section of the forest stewardship plan contains the critical information related to the sustainable management of this woodlot. A detailed description of each individual forest stand identified on this acreage followed by the management prescription that outlines the forest management recommendations is provided. These recommendations highlight the management activities which should be performed in order to manage this property to its utmost productive capacity. Included in these recommendations are the silvicultural harvest systems that should be employed to manage the stand for the desired species, the recommended harvest technology to be used and a time frame in which to accomplish this work.

The forests on this woodlot support a variety of tree species. Each has a corresponding value including economic, aesthetic and wildlife. Proper forest management tries to meld the specific soils with the appropriate silvicultural methods and the goals of the landowner. As indicated, soils play a major role in determining the forest types or species growing on a specific location. In the case of the County Farm, the majority of the soils fall into the Group IA category. These typically favor hardwood production.

Since soils play such an influential role in the composition and productivity of a forest stand, successional trends will occur over time. The composition of any given stand is related to the tolerance of an individual tree species to shade. For example, white pine and white birch are quick to forest an abandoned field. They are not tolerant to shade. Other species such as hemlock and beech are extremely shade tolerant and can establish themselves and grow well underneath an existing forest canopy. Timber harvesting interrupts the degree of shade by creating openings in the forest canopy. This is often desired. Two common harvesting schemes include the harvesting of individual trees known as Individual Tree Selection and the removal of small groups of trees known as Group Selection. As the forest matures, sequential thinnings should be incorporated to remove any undesirable trees and improve the growth opportunity for the select crop trees. This is traditionally accomplished by using the individual tree selection system. This method generally encourages the establishment of shade tolerant regeneration including hemlock and beech. When regeneration of the forest is a primary goal, the use of the group selection system is often preferred since these larger openings encourage more shade

intolerant desirable trees such as white pine, birch, maple and oak. Greater ground disturbance or scarification of the mineral soil generally occurs in the group selection approach creating a better seedbed for these desirable species to become established.

The following section provides a description of each forest stand followed by the management prescription for that stand: (Appendix G, Forest Type Map)

Stand # 1 **White Pine** **Stand Description**

Stand Statistics:

- Total acreage: 66 acres
- Total Basal Area: 154 square feet per acre (trees 2" DBH and larger)
- Total Merchantable Basal Area: 125.7 square feet (This figure represents trees 8"DBH and larger)
- % Basal Area by Species WP 90.91%, Hm 1.14%, Sp 1.14%, R.M., 3.41%, RO 2.27%, WB 1.14%
- Merchantable Mean Stand Diameter: 13.6 inches (This figure represents trees 8" DBH and larger)
- Trees/ Acre: 124 (This figure represents the total number of trees 8" DBH and larger)

This stand contains predominantly white pine mixed with a variety of mixed hardwood and softwood saplings and pole size trees in the understory as well as scattered pulpwood and sawtimber trees in the overstory. The exception to this are three of the major white pine stands located in Compartment # II and consisting of approximately 23 acres. These areas were logged using whole tree harvesting in the summer of 2005. Virtually all of the understory and mixed hardwood stems were harvested in these three areas leaving essentially a pure stand of white pine sawtimber. Site scarification from the harvesting equipment prior to a seed year expected in 2006, will hopefully ensure the establishment of sufficient natural white pine regeneration on these sites. To help ensure success, these areas were direct seeded in the fall of 2005 with white pine seed as well. The remaining stands of white pine included in both Compartments # II and # III consist of islands of mature 90+ year old trees. There are no areas of either sapling or pole stands of young pine throughout the property.



White pine stand in Compartment # II thinned in summer 2005
photo taken Spring 2006

Stand Prescription

This stand supports an excellent stocking of white pine sawlogs. The basal area of the stand should be reduced to approximately 110 square feet to maximize the growth and volume production of this stand. Dominant high quality single stem trees should be retained in any thinning operation. A good distribution of diameters ranging from 8 inches up to 24 inches in size should be retained. Proper spacing between crop trees that allows for at least five feet of open space between crowns on preferably all four sides of the crop tree but at least three sides if possible should be accomplished in the initial improvement harvest. The initial harvest should focus on removing approximately 20-25% of the standing volume of merchantable forest products. A ratio of 30% pulpwood and 70% saw timber is the approximate product mix that will be harvested from this initial improvement harvest. This initial thinning should generate in the neighborhood of 3 thousand board feet of sawlogs and 3 cords of pulpwood per acre. The harvest should be timed with a natural white pine seed year and logged during bare ground prior to or during seed drop. This will maximize site scarification and natural reseeding of white pine. These soils are conducive to growing hardwood because of the deep loamy texture and its water

retention characteristics. Hardwoods will encroach after the initial harvest due to the sunlight that will penetrate the canopy and reach the ground floor. Because of the shade, shade tolerant hardwoods like red maple and beech often become the dominant hardwood species to occupy the site. This leads to the slow conversion of this productive white pine stand to eventually a lesser productive and less valuable hardwood forest. It will be important to try and retain this acreage of white pine on the County Farm since white pine is our most productive and therefore highest income generating specie per acre. Fully stocked stands of white pine can generate 30-50 thousand board feet per acre at the end of a 100+ year rotation. Our best hardwood sites can produce between 6-8 thousand board feet per acre in the same time frame.

White pine stands harvested in this conservative manner will be ready for a second thinning in about 12-15 years. One can expect 4-5 harvests from these stands before the final overstory is removed to allow the next generation of trees to mature. Hopefully, the establishment of white pine reproduction is achieved after the first or second harvest so that a future stand of white pine can be ensured. Three white pine areas in Compartment # II were harvested in September 2005, using whole tree harvesting (WTH). Most of the hardwood was removed for firewood. All small diameter understory growth was removed in order to prepare the site for natural regeneration. The anticipated seed year did not materialize in the fall of 2005. It looks like the fall of 2006 will be a good seed year. To improve the chances for white pine to get established, Peter Pohl direct seeded 25 pounds of white pine seed blended with 150 pounds of winter rye. This mix was broadcast spread using a hand crank seeder throughout much of the harvested area. At the writing of this report, the success of this effort is yet to be determined.

These areas can be harvested using anyone of three harvest technology systems. The ideal method of removing all the undesirable growth regardless of diameter size and to maximize the utilization of all the harvested trees is to use the whole tree harvesting method. (WTH). In addition to the total utilization, the site is well scarified to encourage the natural reseeding of white pine provided the harvest is timed with a cone crop. This method is preferred by many because the site looks very neat and clean. Care must be taken to avoid damaging the residual stems that are left. Generally, the initial treatment will focus on the removal of individual trees creating the desired spacing between crop trees. In some instances, small openings can be created where there is a lack of high quality crop trees.

The second method is to use the cut to length approach (CTL), where a harvester harvests the trees and cuts them to the desired log length. A forwarder then removes the logs to the landing area. This method causes very little residual stand damage. The limbs are generally placed in the road ways where they are driven over by both the harvester and the forwarder. This compaction causes this debris to rot quickly adding nutrients to the soil.

The final method of harvest is the conventional chain saw and skidder technique. This can be done very efficiently and carefully as well. The debris from the trees harvested is left on site and is usually lopped close to the ground to improve the appearance of the job and to accelerate the decay process. Again, the nutrients from this debris are returned to the soil as opposed to being chipped in the whole tree harvesting technique.

The remaining unthinned stands of white pine should receive this initial treatment over the next 10-15 years. Reentry into the recently thinned areas can occur in 10-15 years.

Stand # 2

Mixed Hardwoods

Stand Description

Stand Statistics:

- Total Acreage: 71 acres
- Total Basal Area: 117 square feet per acre (All trees 2 " DBH and larger)
- Total Merchantable Basal Area: 80 square feet per acre (All trees 8" DBH and larger)
- % Basal Area by Species: RO 36.76%, RM 20.59%, Be 16.18%, SM 8.82%, WB 5.88%, Bw 4.41%, WA 2.94%, YB 1.47%, WP 1.47%, Sp 1.47%
- Merchantable Mean Stand Diameter: 10.8" (All trees 8" DBH and larger)
- Trees/Acre: 125.3 (Number of trees 8" DBH and larger)

This stand consists of a mix of hardwoods with red oak, red maple and beech comprising the majority of the species in descending order. The overall quality of the crop trees is good with an average volume per acre equal to approximately 3734 board feet of sawlogs and 9 cords of pulpwood per acre.

The ice storm of January 1998, caused light to severe damage throughout this stand. The majority of the area is light to moderate, but two areas received severe damage. The first is located in Compartment # II near the Ossipee/Wolfeboro town line. This area is visible from Route 28 and follows the ridge line. There are approximately 2 acres in this area that were largely salvaged for firewood shortly after the storm.



Ice storm damage and salvage January 1998, in Compartment # II near Route 28
photo taken Spring 2006

The second area located in Compartment # III is near the northeast corner of the Compartment north of the power line and is approximately 15 acres in size. Much of the beech experienced severe damage and is now showing evidence of significant mortality. The red oak experienced less damage and has responded by sending out epicormic branching to compensate for the loss of limbs.

The understory and regeneration throughout much of this stand tends to be largely less desirable growth including beech, striped maple, red maple with desirable softwoods including hemlock, spruce and occasional white pine beginning to occupy the site.



This area in Compartment # III experienced the most extensive ice damage in 1998.
photo taken Spring 2006



High quality hardwoods typical of this particular stand.
photo taken Spring 2006

Stand Prescription

This stand is overstocked. The recommended basal area for a hardwood stand is between 70 - 80 square feet per acre. The average total basal area for this site is 117 square feet per acre.

A harvest using both the individual tree and group selection method should be employed in the management of this stand. Group selection should definitely be used in the severely damaged stand in Compartment # III. Much of the beech should be harvested leaving any healthy dominant ones for mast production. Trees which have evidence of bear claw marks on the trunk should also be retained since these trees are recognized by bears as good mast producers. A few dead and dying beech should be left as they will develop into wildlife trees. Woodpeckers will create cavities in the decaying wood and these trees will serve as "Critter Condos". Beech nuts are a favored food for bear and other wildlife. The majority of the red oak should be retained for both timber and mast production. Severely damaged as well as poor quality oak should be harvested. Efforts should be made to regenerate red oak in the group

selection cuts by scarifying the site as much as possible during the harvest operation as well as timing the operation with both bare ground conditions and an abundant acorn crop. Mid - summer to late fall prior to the fall rains is ideal timing to maximize the regeneration opportunities for red oak, white birch and sugar maple.

Other hardwood stands in both Compartments # I and # II received only light damage. Again, releasing individual high quality crop trees using both the group selection and individual tree selection silvicultural systems is the recommended treatment for this entire stand.

I estimate 750 - 1000 board feet of sawlogs and 5-7 cords of pulpwood/firewood per acre can be harvested throughout this stand. Since the county farm wishes to harvest 150+ cords of firewood per year on a sustainable basis, careful planning and alternating harvests within this stand and the other five stands on the property will be essential.

The salvage harvest in the severely damaged site in Compartment # III will generate an excess amount of wood that will meet the firewood needs of the county farm for 2-3 years.

All three harvest methods can be used in this stand. I recommend whole tree harvesting (WTH) in the 15 + acre area in Compartment # III. The extent of damage warrants a salvage operation. This technique will permit maximum utilization of even the smallest diameter low valued trees that would impact the chances for desirable regeneration to become established. Again, seed years, site scarification and small group selection cuts are the necessary ingredients that must occur in order to regenerate this area with a better mix of desirable species to include red oak, sugar maple, white and yellow birch. The cut to length (CTL) method is also a possibility. Greater income generation due to the production of biomass chips for fuel which can exceed 25 tons per acre is achieved using the WTH approach.

The conventional chain saw/skidder approach should not be used because of the potential risk to the logging crew from dead limbs in many of the damaged trees. Enclosed cab equipment is the only safe way to harvest this area. The conventional method can be used in other areas where this hardwood stand is located in Compartment # I.

Stand # 3

Hemlock/White Pine/Mixed Hardwood

Stand Description

Stand Statistics:

- Total Acreage: 104 acres
- Total Basal Area: 115 square feet per acre (All trees 2" DBH and larger)
- Total Merchantable Basal Area: 94.1 square feet per acre: (All trees 8" DBH and larger)
% Basal Area by Species: HM 58.27%, WP 6.3%, Sp 1.57%, RM 11.81%, Be 11.02%, RO 3.94%, SM 3.94%, WA 79%, YB 79%, WB 79%, BC 79%
- Merchantable Mean Stand Diameter: 13.0" (All trees 8"DBH and larger)
- Trees/Acre: 102 (All trees 8" DBH and larger)

This stand consists of predominantly hemlock and white pine and a mix of hardwoods with red maple and beech comprising the majority of hardwood trees followed by lesser amounts of red oak and sugar maple and a very small quantity of white ash, yellow birch, white birch and black cherry.

The overall quality of the crop trees is good with an average volume of approximately 8300 board feet of sawlogs and 6 cords of pulpwood per acre.

A major portion of this stand type is located in Compartment # II. About 61 acres is in the area bordering Rt. 28 and extending northwesterly to the edge of the wetlands. Approximately 26 acres is in Compartment # I (the 36 acre lot) and 16 acres in Compartment # III. The area bordering Rt. 28 has had extensive hardwood firewood harvested in the late 1980's and early 1990's. A guesstimate of the volume of firewood removed during this time period is 600-700 cords. In addition, some hemlock and white pine sawlogs were also harvested as well. A salvage of white pine occurred in 1988-1989 along the edge of the wetlands where flooding from beaver activity had begun to kill sizeable sawtimber quality white pine. An estimate of 30-40,000 board feet of sawlogs was harvested from this stand at that time.



This photo shows the area adjacent to Route 28
photo taken Spring 2006

Stand Prescription

This stand is overstocked. The recommended removal per acre is approximately 2000-4300 board feet of sawlogs and 4 cords of pulpwood per acre depending upon the wildlife management goals for the property. With the large concentration of hemlock, this stand and particularly the area bordering Rt. 28 can be developed into a valuable deer wintering or yarding area. It is advisable to maintain a relatively tight overstory canopy of hemlock in order to reduce snow depths on the forest floor. To accomplish this goal, the lesser suggested volume would be harvested. The past firewood and sawlog harvests in this area created small openings that have filled in with hemlock regeneration, creating a two stage effect with the tight forest canopy preventing snow from penetrating the canopy and the understory regeneration providing protection from the wind. The close proximity to the brook and wetlands provides an essential source of water. Hardwood sprouts stemming from the trees harvested have served as a critical food supply providing the third essential requirement for an effective deer yard. The hardwood sprouts should be cut off at the stump in order to create a succulent food supply for the next five years or so. Once this vegetation becomes too tall and woody, it no longer is an effective source of food for deer because it is out of their reach and the stems are too thick and woody. If the goal is to maximize income, then the larger volume per acre would be harvested. Hemlock reaches its ideal size for dimension lumber at the 18" DBH size class. Most of the volume removed should be in those upper size classes. In addition, an occasional low quality white pine should be removed as well. Efforts to reintroduce white pine regeneration should be a goal for this stand as well. Retaining the majority of the red oak for both sawlog production and as a source of mast for deer and other species is recommended. Select beech of good quality should be retained for its mast production as well. Remove the inferior quality beech and the red maple destined to be pulpwood or firewood.

This stand lends itself to single tree selection and very small group selection cuts where the goal is to encourage white pine regeneration around large standing white pine and increased hemlock regeneration to improve the deer yard characteristics of this stand.

All three harvest technologies are feasible. Where tight stand conditions are to be maintained for deer yard development, the conventional chainsaw/skidder method is recommended so that openings are kept as small as possible. Where it is desirable to create larger openings and remove all the undesirable small diameter understory of low valued trees, the WTH method is preferred. The CTL method is also feasible to use throughout this stand.

Stand # 4 White Pine/Hemlock/Hardwood Description

Stand Statistics:

- Total Acreage: 207 acres
- Total Basal Area: 114 square feet per acre (All trees 2" DBH and larger)
- Total Merchantable Basal Area: 98.9 (All trees 8" DBH and larger)
- %Basal Area by Species: WP 47.19%, Sp 13.20%, Hm 6.46% RP 1.12%, RM 17.70%, Be 4.21%, SM 3.37%, RO 2.25%, YB 1.69%, WB 1.12%, WA 1.12%, Aspen .28%, HH .28%

- Merchantable Mean Stand Diameter: 12.8" (All trees 8" DBH and larger)
- Trees/Acre: 100 (All trees 8" DBH and larger)

This stand is comprised of a mix of white pine which makes up the majority of the basal area, followed by spruce, hemlock and red pine in descending order. The predominant hardwood is red maple followed by beech, sugar maple, red oak and a small quantity of white birch, yellow birch, white ash, aspen and hop hornbeam.

The overall quality of the dominant crop trees is good with an average volume equal to 8400 board feet and 7.5 cords of pulpwood/firewood per acre. Hardwood makes up 4 cords of pulpwood/firewood per acre and would be marketed by the county farm as firewood.

A major portion of this stand type containing 114 acres is found in Compartment # II with a lesser amount equal to 92 acres in Compartment # III.



This photo depicts a typical shot of this stand type.
photo taken Spring 2006

Stand Prescription

This stand is also overstocked with large diameter white pine and scattered hemlock. The majority of the basal area in white pine (28%) ranges in diameter size from 18" DBH to 34"

DBH. The total volume of all species is about 8400 board feet/acre with white pine comprising about 5800 board feet of this volume.

The suggested prescription for this stand is the removal of the majority of the firewood quality hardwood trees totaling approximately 5-7 cords per acre. The high quality red oak and the larger poorer quality specimens should be retained not only as a source of mast for a wide array of wildlife, but as a seed source to regenerate this very desirable tree following a harvest in this stand. All high quality crop trees, regardless of species and ranging in size from 6"-24" DBH should be retained. The removal of approximately 50% of the volume or 4000 board feet per acre should occur over the next 10-15 years. Size classes, 20" in diameter and larger should be the focus of this removal. This level of harvest will create sufficient size openings to regenerate white pine and shade tolerant and intolerant hardwood species. The harvest must be timed with a natural white pine and red oak seed year. The logging should occur in the mid to late summer under relatively dry conditions. This will ensure the maximum site disturbance from the logging equipment. Additional site scarification maybe necessary in order to create the ideal seed bed to achieve the desired level of natural regeneration.

The harvest technology that can be employed includes: all three systems i.e. WTH, CTL, and conventional chainsaw/skidder. Where desirable, small diameter understory needs to be removed for the necessary site preparation. The WTH technique is the preferred method in this case. Where the individual tree selection method will accomplish the silvicultural goal for the forest, the conventional method can be used. The CTL approach can be applied as well and is often a good compromise between the other two methods.

Stand # 5

Mixed Softwood/Hardwood

Stand Description

Stand Statistics:

- Total Acreage: 62 acres
- Total Basal Area: 154 square feet per acre (All trees 2" DBH and larger)
- Total Merchantable Basal Area: 122.9 square feet per acre (All trees 8" DBH and larger)
% Basal Area by Species: Hm 25.58%, WP 15.12%, Sp 5.81%, RO 17.44%, RM 10.47%,
Be 9.30%, WA 8.14%, SM 4.65%, YB 3.49%
- Merchantable Mean Stand Diameter: 12.1" (All trees 8" DBH and larger)
- Trees/Acre: 154.6 (All trees 8"DBH and larger)

This stand is overstocked and is comprised of a mix of predominantly hemlock and white pine and a small quantity of spruce. The hardwood species in declining order of abundance are red oak, red maple, beech, white ash, sugar maple and yellow birch. The overall quality of the dominant crop trees is good. The average total volume per acre of sawlog material is about 8800 board feet and 10 cords of pulpwood/firewood per acre. White pine and hemlock comprise about 5400 board feet or about 61% of this total volume with the mixed hardwood representing about 39%. The approximate 10 cords of pulpwood/firewood per acre is made up of 8 cords of hardwood and 2 cords of softwood.

Approximately 46 acres of this stand type is located in Compartment # II and 16 acres is in Compartment # III.



This photo depicts a typical area of this stand.
photo taken Spring 2006

Stand Prescription

This stand is overstocked with large diameter white pine and hemlock. The majority of the basal area in softwood consists of hemlock (25.58%) with white pine second at 15.12%. The majority of this volume is in trees 18" - 30" DBH in size. The total sawlog volume per acre is equal to 8800 board feet. The total softwood volume is 5900 board feet and the hardwood volume is estimated to be 2250 board feet per acre.

The suggested prescription is to lower the basal area per acre by removing about one third of the volume of white pine. This represents about 1100 board feet in mostly trees larger than 18" DBH and about half the volume of hemlock (1000 board feet) in trees ranging in size from 12" to 24" DBH. Approximately 5-6 cords per acre of hardwood pulpwood/firewood would be harvested as well. This would be marketed as firewood.

This level of harvest will remove about one third of the merchantable volume from this stand over the next 10-15 years. The focus should be to remove the poorest quality and most mature trees. Retention of healthy high quality and over mature red oak and beech is desired not only as a seed source for regeneration, but as a critical food source for deer and bear and a wide array of other wildlife that depend on this mast crop for food.

Regeneration throughout the Carroll County Farm woodland is a prime concern as there was ample evidence in each stand of an abundance of striped maple, beech, witch hazel and other inferior species that have little or no commercial importance.

The proposed harvest will combine single tree selection with group selection cuts in the desired locations. Timing these operations with a natural seed crop will encourage a more favorable species mix such as white pine, red oak, white and yellow birch and sugar maple. Hemlock regenerates very well following single tree removals. Once again, as in the other stands, dry, bare ground conditions during the harvest operation prior to or during seed drop is essential to maximize scarification and minimize rutting and create ideal seedbed conditions for germination.

The harvest technologies that favor group selection harvests where complete small diameter tree removal in the understory is the goal is the WTH method. This process generates an additional biomass product for fuel, thus maximizing income from the site.

In areas designated for single tree selection, the conventional chainsaw/skidder is appropriate to use. The CTL system can also be used effectively in a single tree and group selection harvest. Minimal stand damage is experienced with this equipment as logs are removed in log length as opposed to the entire tree. Slash is deposited in skid roads and flattened by the track equipment.

Stand # 6

Mixed Hardwood/Softwood

Description

Stand Statistics:

- Total Acreage: 245 acres
- Total Basal Area: 144 square feet per acre (All trees 2" DBH and larger)
- Total Merchantable Basal Area: 89.9 square feet per acre (All trees 8" DBH and larger)
% Basal Area by Species: RM 22.81%, RO 15.79%, Be 8.77%, SM 7.46%, WB 7.02%,
WA 7.02%, YB 5.26%, Bw .88%, Aspen .44%, BC .44%, WO .44%, Elm .44%, HM
13.16%, WP 8.77%, Sp 1.32%
- Merchantable Mean Stand Diameter: 11.5" (All trees 8"DBH and larger)
- Trees/Acre: 123.1 (All trees 8"DBH and larger)

This stand is overstocked and is comprised of predominantly mixed hardwood including red maple, red oak, beech, sugar maple, white birch, white ash and yellow birch in descending order and small volumes of basswood, aspen, black cherry, white oak and elm. Softwoods comprise 23% of the basal area with hemlock the dominant species followed by white pine and spruce. The overall quality of the dominant crop trees is good. The average total volume of sawlog material is about 4500 board feet and 9 cords of pulpwood/firewood per acre. The hardwood species represent about 2631 board feet and 8 cords of pulpwood/firewood per acre. The softwood species represent 1924 board feet and 1 cord per acre.

This stand type is located in Compartment # I and comprises 16 acres of the 18 acre lot, 107 acres in compartment # II and 122 acres in Compartment # III.



This picture depicts a typical area of this stand
photo taken Spring 2006

Stand Prescription

This stand is overstocked. The basal area should be lowered to about 80 square feet per acre. The total hardwood volume equal to 2631 board feet and 8 cords of pulpwood/firewood should be reduced by about a third focusing on the removal of the lowest quality resulting in the release of dominant crop trees. The large diameter white pine 24" DBH and larger can be removed leaving a distribution of white pine size classes up to that size. Hemlock volume is approximately 500 board feet per acre with the majority of this volume in trees that exceed 18" DBH and on up to 26" DBH. These are well beyond maturity and if you want to recover as much sound volume and therefore value many of these trees are ready to be harvested. The soundness of the lumber in hemlock can begin to decline above 18" DBH. An occasional large diameter tree should be retained for aesthetics and as an important wildlife tree. Overall, I recommend the harvest of approximately one third of the merchantable sawlog volume of hardwood and softwood species as well as the softwood pulpwood quality growth. I would harvest about 30-40% or 2-3 cords of the hardwood pulpwood/firewood per acre. This conservative removal of this low grade product is suggested so that this sizeable stand, which makes up about 32% of the

total forested acres on this property, will provide a sustainable supply of 150+ cords of firewood annually for sale by the County Farm.

Regeneration is an issue throughout this stand. Individual tree selection is recommended for the hemlock sites as this will free up high quality crop trees and the light penetration through the canopy will encourage the establishment of hemlock regeneration.

Areas supporting red oak should be thinned to release the dominant stems so as to enhance their mast production capability. Small groups can be created around these crop trees. Logging during a seed year and on bare ground is essential in order to regenerate this specie naturally.

Small openings around the dominant white pine will also enhance the introduction of white pine regeneration.

Hardwood areas supporting an array of species and quality can be selectively thinned but one must recognize beech and red maple are likely to regenerate the site as opposed to a greater concentration of shade intolerant species.

All three harvest technologies can be used. The conventional method is recommended where individual trees and little concern for the removal of small diameter understory growth is the goal. The WHT method is best suited for those areas in need of extensive understory removal and where desirable regeneration is an issue. The CTL technology is appropriate in many areas as well.

Schedule of Priorities

1. All boundary lines should be reblazed and painted. DO NOT blaze over the old blazes. Repaint the old ones and make new blazes where necessary. The old blazes provide evidence of the existing boundary lines. Paint two or three inches of bark around the blaze as this will ensure the paint remains visible long after the blaze has calloused over. Use implement enamel as this seems to last the longest. Boundary lines should be remarked about every 20 years.
2. Hedge rows along fields that were cut back during the 2005 timber sale should be sprayed in late summer 2006 in order to kill sprouting hardwoods. All fence posts and barbed wire should be removed and hayfields restored back to the edge of the stone walls.
3. Proposed timber harvest operations should be conducted in the following suggested order: (Appendix K for maps showing the location of each sale). These timber sales should be spaced 2 to 3 years apart except where noted.
 - a. A 38 acre timber sale will be marked in Compartment III. It is the area to the left of the overgrown road bordering the field and extending up and into the former Bickford property. This should be a biomass operation in order to remove all low grade forest products in order to prepare the site for natural regeneration. Complete this project in the summer or early fall 2006.
 - b. The hardwood stand located in the northeast corner of this compartment needs extensive salvage due to the serious damage caused by the January 1998 ice storm. Complete this project in 2007. The remainder of the northeast corner of this compartment can be treated at this time.

- c. Conduct two separate harvest operations in the former Bickford Lot by opening up access to the center of the lot via the overgrown access road. Treat this 117 acre parcel as two separate timber sales covering about one half the area in each sale. This work to be completed in the next 5-10 years.
- d. Conduct harvest in Compartment # III south of the ice damaged area and east of the service road that goes from the field near the Superior Court House to the well house. This area extends over to the eastern boundary of the property and lies north of the Court House.
- e. Complete harvest in Compartment # I in the 36 acre and the 18 acre lot. This work to be done during the next 10-15 years.
- f. Harvest the western half of Compartment # II between the Ossipee / Wolfeboro Town Line and the southwest side of the woods road leading from the old dump site and pond to the northern most field. The northern half of this harvest area would be yarded along side the edge of this northern field labeled # 1 on the forest type map. (Appendix G for Forest Type Map) The southern half will extend from the Ossipee / Wolfeboro town line northeast to the wetland labeled # II on the map and over as far as the brook which exits out of the pond near the old dump site and which feeds into wetland # V on the map. The forest products from the southern half of this area would likely be yarded in the landing located at the end of the woods road in approximately the middle of this area. This project can be treated as 2 separate timber sales.
- g. The next area in Compartment # II is located north of the timber sale completed in 2005 and extends west to the woods road that goes to Field # 1 and north to the road that leads from Route 171 and goes to Field # 1 on the map. This area extends east to Route 171. The landing for this project can be along side of Field # 7 bordering Route 171.
- h. The next is a harvest in Compartment # III in the area east of the road leading to the well house and field over as far as the service road going to the well house and as far south as the southern boundary.
- i. Harvest the area in Compartment # II that borders Route 28 and extends north to wetland # V on the map and to the brook which parallels Route 28.
- j. Harvest in the white pine stands that were thinned in 2005. Monitor white pine regeneration to see if annual growth is stagnating. That is an indication additional light is needed. If hardwood competition is serious, plan to do a timber stand improvement treatment to release the regeneration from the hardwood competition. Additional thinning in these areas is anticipated in 2015-2020.

The above timber sales should be accomplished over the next 20-25 years. If the harvest is conservative and removes about 20-25% of the volume in each area, once all the sales are completed, you should be able to reenter the first site on the list to repeat the process.

4. This management plan should be updated sometime between 2015-2020. The forest type map should be modified to reflect any changes in the timber types. A timber cruise is essential in order to determine the volume of forest products on this acreage. Adjustments to the cutting should be made based upon this updated timber inventory.

Summary Table

Showing Total Timber Volumes and Suggested Harvest Volumes by Stands on the 732 acres of Forest Land During Next 20 +/- Years

Stand #	Total Volume Sawlogs bf		Total Volume Pulpwood/ Firewood cords		Total Harvest Volume bf		Total Harvest Volume cords	
	SFW	HDW	SFW	HDW	SFW	HDW	SFW	HDW
1	880,506	15,384	264	78	208,309	3,879	137	53
2	0	265,150	27	630	0	66,815	11	420
3	727,385	129,577	246	382	371,695	70,580	137	275
4	1,498,987	229,676	720	836	715,139	112,240	513	654
5	295,228	147,890	120	400	110,905	37,319	48	279
6	458,639	776,538	253	1,905	198,329	233,507	138	1,352
Totals	3,860,745	1,564,215	1,630	4,231	1,604,377	524,340	984	3,033

Note: About 42% of the total estimated softwood sawlogs not counting in growth will be harvested during 2006-2026.

About 33% of the total estimated hardwood sawlogs not counting in growth will be harvested during 2006-2026.

About 60% of the softwood pulp not counting in growth will be harvested during 2006-2026.

About 72% of the hardwood pulpwood could be harvested during 2006-2026.

The County Farm depends upon a significant volume of firewood quality growth to sustain their firewood operation. The level of hardwood firewood removal during the suggested timber sales listed under the schedule of priorities needs to be reduced. I would suggest about 40-50% removal and then review this figure when the next timber inventory of the property is done in about 2015. This exercise will help determine if the firewood removal is sustainable on an annual basis.

Estimated Timber Volumes and Values June 2006

Sawlogs

species	total volume bf	stumpage value mbf	total value
White Pine: sawlog box	2,470,222 31,269	\$175 \$30	\$432,250 \$938
Hemlock	1,055,712	\$40	\$42,228
Red Pine	34,026	\$50	\$1,700
Spruce	269,576	\$100	\$26,868
Beech: sawlog	71,691	\$40	\$2,868
Red Oak: sawlog veneer	339,856 210,796	\$300 \$600	\$101,940 \$126,480
Sugar Maple: sawlog	110,467	\$300	\$33,120
Red Maple: sawlog	270,562	\$75	\$20,295
White Ash	147,146	\$75	\$11,132
Yellow Birch	81,813	\$80	\$6,544
White Birch	117,211	\$75	\$8,790
Aspen	17,227	\$30	\$516
Black Cherry	6,442	\$100	\$644
Basswood	14,435	\$30	\$432
Elm	9,924	\$30	\$297
Hardwood Pallet	155, 839	\$35	\$4,453

Pulpwood

species	total cord volume	stumpage value cord	total value
Hardwood	4,230	\$12	\$50,760
Softwood:			
White Pine	851	\$2.50	\$2,127
Hemlock	522	\$8	\$4,176
Spruce	254	\$9	\$2,286

Biomass

species	biomass total tons	stumpage value / ton	total estimated value
Hardwood / Softwood Fuelwood chips	18,000-36,000	\$1.00	\$18,000-\$36,000

Total Value: \$916,844.*

- * Note: This figure is conservative and reflects average stumpage prices. Timber sold on a bid basis typically receives higher prices.
- * See Appendix L for stumpage rates for April 1, 2006 - September 30, 2006 for Central New Hampshire published by Department of Revenue Administration.

Historic, Cultural and Archaeological Sites

This property is rich with a variety of historic and cultural features. One of the first of these is the extensive stone wall system which comprises lengthy sections of both the external boundaries of the property as well as internal walls which formed boundaries between agriculture and forest uses of the property. I estimate the following footage of stone walls by compartments:

compartment	external boundaries	internal boundaries
I	0	0
II	7,270 feet (1.4 miles)	15,310 feet (2.9 miles)
III	11,290 feet (2.13 miles)	28,500 feet (5.4 miles)
Total	18,560-19,000 feet (3.5 miles)	43,810 feet (8.3 miles)
Grand Total: Exterior & Interior Stone Walls	62,370 feet (11.8) miles. Estimated figures +/- 5%. Not every section of interior wall was located during the cruise. All walls should be located with GPS the next time the map is updated.	

This extensive footage points to the significant agricultural use of sections of this acreage. Areas of the property were walled off to separate intensive crop production from the areas that were devoted to the pasturing of livestock.

The discovery of four farms and or house and barn sites as evidenced by the cellar holes and barn foundations in Compartment # III further support the conclusion that this acreage was intensively farmed during the 1800's and into the early 1900's. There is no evidence of habitation in Compartment # I. Compartment # II has evidence of one cellar hole located on the edge of the field along the northwestern boundary approximately 900 feet in off Route 171.



Cellar hole on the north edge of Field # 1 Compartment # II
Photo taken Spring 2006

Compartment # III was the most intensively developed and consists of four farms. The first is located near the northeastern boundary about half way up the length of the property beginning from the edge of Route 171. The 1942 map prepared by George Stenzel shows a woods road near this bound. This road location was hard to discern during the 2005 cruise. Extensive internal stone walls throughout this area point to the agricultural use at the turn of the previous century.



Cellar hole located near the northeastern boundary north of Court House
photo taken Spring 2006

The second foundation site was the site of the ski lodge used when the ski slope was in use in the 1940's. This site is located about 575 feet from Route 171 along the southwesterly side of the road leading into Compartment # III. This site is partly overgrown field.



Ski Lodge located at base of former ski slope
Courtesy photo Matt Sawyer, Ossipee, NH



Ski Team circa 1940's
Courtesy photo Matt Sawyer, Ossipee, NH



Remaining evidence of foundation of the ski lodge
photo taken Spring 2006

Another interesting feature of this property was the former site of a ski tow and slope that was identified on George Stenzel's 1942 map (Appendix D). At that time, this area bordering the western boundary of this compartment was open pasture. During the cruise, one of my cruise lines took me directly over the remnants of the building which housed the motor for the rope tow. The building had collapsed. An empty gas can lies at the site. In mentioning this fact to John Magee, landowner from Wolfeboro, he stated he used to ski at this site when he was a youngster. John recalled, with fond memories, the fun he and his friends had on this slope. It was a short but fast slope he stated. It was a treat to interview someone who had recreated on this abandoned site which has now been reclaimed by forests over the past 60 years. As mentioned above, there was a ski lodge to accommodate the skiers when they needed to get out of the cold.



Remains of building at top of the ski slope
photo taken Spring 2006

The second house and barn site is located on the southwesterly side of the walled in overgrown road leading into the current pasture in this compartment. This house and barn are located about 1450 feet from Route 171. The cemetery is located about 1150 feet from Route 171. Family by the name of Brown are buried there.



House Foundation near where the Brown Cemetery is located
photo taken Spring 2006



Barn Foundation adjacent to cellar hole
photo taken Spring 2006



Brown Cemetery
photo taken Spring 2006

The third house is located about 300 feet from the edge of the field where the cell tower is currently located. It is on the northeasterly side of the overgrown road. The barn site is located 200 feet beyond this house site on the same side of the old road.



House Site north of Field # 3 Compartment # III
photo taken Spring 2006



Barn site north of cellar hole
photo taken Spring 2006

The fourth house and barn site is located on the former New England/Fred Bickford Lot purchased by the county in 1975. It is approximately 250 feet from the former boundary of the County. A barn foundation is located about 50 feet to the west of the house site and is evidenced by a large stone ramp leading into the front of the barn. (Appendix G for the approximate location of these former farms).



House Site on former Bickford property
photo taken Spring 2006



Barn Site and Ramp on former Bickford property
photo taken Spring 2006

In addition to the cemetery that was mentioned above, there are five additional cemeteries on this acreage. These are located in Compartment # II. The first is located near the southeastern corner of the property and is in an island of trees surrounded by stone walls. This area is surrounded by hay fields. The evidence of head stones is limited to a small area within this walled in section of woods. Family by the name of Goodwin are buried there.



Goodwin Family Cemetery
photo taken Spring 2006

The second cemetery is located in a section of overgrown field about 80 feet southwest of the white pine stand adjacent to the County Administration Building. Commissioner David Sorensen has a number of beehives located along the southwest boundary of this small 40-50 foot walled in square. The stone markers resemble field stones with no inscriptions.



Overgrown Unmarked Cemetery
photo taken Spring 2006

The other three cemeteries are located in Compartment # II along the southwestern boundary of the white pine stand adjacent to the Administration Building. These three cemeteries are all in close proximity to one another but are separate and are either walled in or have stone posts surrounding the graveyard. The Nay Family is buried in the largest one that is located in the woods.



Nay Family Cemetery
photo taken Spring 2006

The Dore Family is in the next largest and the Wiggin Family is in the smallest one. The larger of the two in the field is visible from Route 171



Dore Family Cemetery
photo taken Spring 2006



Wiggin Cemetery
photo taken Spring 2006

One other cultural feature discovered during the timber cruise was the dam like structure that exists on the main brook in Compartment # II near where it crosses Route 28. A well constructed stone structure with cut stone was built to, I suspect, dam up the stream. There may have been some type of mill constructed on this site. There is also evidence of a stone bridge abutment adjacent to this dam. The brook would have been bridged at this location.



Stone Dam
photo taken Spring 2006



Rock Abutment where bridge and road were located
photo taken Spring 2006

Another man made object that I discovered was the presence of hundreds of feet of steel cable over an inch in diameter that can be found along some of the stone walls bordering the overgrown road and other walls in Compartment # III. I am not sure what purpose or use was made of this cable.



Cable growing through a sugar maple
photo taken Spring 2006

Compartment # III also has a spring house which has been the principle source of water for all the facilities on the County Farm Property and I understand as well as the village of Ossipee. A new water line was installed a number of years ago from the spring house to the county complex. This should alleviate the maintenance problems that plagued the facility.



Well house complex that supplies water to the County Farm and Ossipee Village
photo taken Spring 2006

A cell tower was also constructed at the north end of the pasture in Compartment # III. This structure provides rental income to the county.



Cell tower located at the north end of Field # 3 Compartment III
photo taken Spring 2006

Water and Wetland Resources

This property has a number of important water and wetland resources that serve a number of important purposes.

There are three significant wetlands and two minor ones all located in Compartment # II. The first wetland of significance is located near the site of the old dump. There is .85 acres of open water and 1.85 acres of marsh associated with this wetland for a total area of 2.7 acres. The water that exits this wetland feeds the major year round brook that traverses through Compartment # II and crosses Route 28 near the southeast corner of the this compartment.



Wetland # I near old dump
photo taken Spring 2006

The second major wetland is located west of the first one described. It contains about .8 acres of open water and 4.2 acres in marsh for a total of 5 acres.



Wetland # II, near the Ossipee/Wolfeboro town line
photo taken Spring 2006



Wetland # II fresh beaver activity
photo taken Spring 2006

The third major wetland, labeled Wetland #V on the map, is fed by the major brook described above and is within earshot of Route 28. It contains .5 acres of open water and 4.5 acres of marsh for a total of 5 acres. The brook flows out of this wetland and crosses Route 28.



Wetland # V near Route 28
photo taken Spring 2006

The two minor wetlands include the one adjacent to Route 28 and contains about .9 acres of marsh. The second is located near the central road leading to the old dump site. It borders the septic field and consist of 1.6 acres of marsh. These are labeled Wetland # 3 and # 4 respectively on the forest type map.

In addition, a .2 acre pond was designed and constructed by David Weathers (retired) from the Natural Resource Conservation Service. This pond has a dry hydrant and functions not only for fire protection but can be used to irrigate the garden where small fruits and some vegetables are grown.



Pond Constructed by NRCS
photo taken Spring 2006

Safety

Throughout the cruise, the most apparent safety concern is the ice damage caused by the January 1998 ice storm. As discussed, two areas were particularly hard hit by this phenomenon. The first in Compartment # II near the Ossipee / Wolfeboro town line which is visible from Route 28 has been largely salvaged.



Ice damage salvage area in Compartment # II near Route 28
photo taken Spring 2006

The second area is located in the northeast corner of Compartment # III. A significant number of beech trees were damaged and show signs of mortality. The red oak experienced less damage and has formed significant epicormic sprouts to compensate for the loss of limbs. A salvage in this stand is a top priority in the next few years. Mechanized equipment must be used to harvest this site for safety reasons. Throughout the rest of the property, limb breakage is evident ranging in severity from slight to moderate except for the above two locations.



This picture shows the severe damage in Compartment # III
photo taken Spring 2006



This photo shows the epicormic branching which has occurred on the red oak to compensate for
the loss of limbs
photo taken Spring 2006

The second safety issue is an open well in Compartment # III near the edge of the power line in the vicinity of the cell tower. This stoned well is about 6-7' across and is near the cellar hole of the farm that occupied this area of the property. A steel cover should be put on top of this well.



Open stoned well poses safety hazard
photo taken Spring 2006

Insect and Disease Issues

Much of the beech located throughout the property shows evidence of the Beech Bark Disease. This insect fungus “complex” occurs when a species of Nectria infects the bark of the trunk of beech through the feeding wounds made by the scale insects. The insect secretes a white, woolly wax covering that can be seen very readily. The fungal invasion causes dead dark patches. These wounds can be walled off giving the tree a “pock-marked” appearance. Severely damaged trees are weakened at the point of infection and often break off in high winds at the point of the infection. The recommended treatment is to salvage and harvest the infected trees.



This picture shows the damage to the beech from the Beech Bark Disease
photo taken Spring 2006

The Hemlock Woolly Adelgid is another potential major concern on this property due to the large volume of hemlock throughout the woodlot. This pest has appeared in southern New Hampshire along a line that extends from Portsmouth to Concord and on to the Vermont border. Some contaminated nursery stock was reported in the Wolfeboro area some years ago but it was destroyed. Mild winters will exacerbate the spread of this serious insect pest. It feeds on the foliage of hemlock and over a 3-5 year period seriously defoliates, weakens and ultimately kills the tree. This woodlot must be monitored for this insect. If an infestation does occur, there is currently no practical way the pest can be eradicated. A harvest schedule would have to be developed in order to salvage the infected trees before they die.

Rare and Endangered Plant and Animal Species and Invasive Plants

No rare or endangered plant or animal species were encountered during the cruise of this acreage. Barberry, an invasive plant, was identified in the overgrown fields and along hedge rows.

To find the potential for any rare native plant and animal existing on this acreage, the Natural Heritage Inventory may be consulted at 172 Pembroke Road, PO BOX 856, Concord, New Hampshire 03302-0856.

Enclosed is a copy of the Endangered and Threatened Wildlife of New Hampshire publication by the New Hampshire Fish and Game Department. (AppendixM) In most instances, timing and sound forest management practices, if keyed with wildlife habitat improvement, will avoid most of the species on the list. If an endangered species were observed on the property, then specific measures that apply to that species could be enacted to either avoid the area or enhance specific habitat. Consulting with a specialist is recommended.

Wildlife

This property is home to a wide range of wildlife. Forest management activities on a regular basis have been effective in enhancing habitat for a wide variety of species. Evidence of moose, deer, beaver, bear, rabbit, porcupine, wood duck, Canada geese, turkey, partridge and woodcock were observed.

The 15 acres of wetland in Compartment # II provide critical habitat for a variety of water fowl. A beaver colony is very active in wetland # II. The wood shop is planning to construct wood duck boxes which will be installed in the winter on all wetlands when the boxes can be installed on snags in the marsh areas.

The hemlock/mixed hardwood stand located in Compartment # II in the area north of Route 28 and extending to the brook and wetland # V is a potential deer yard. This area has a dense overstory of hemlock necessary to reduce build up of deep snows. The understory hemlock regeneration provides protection from winter winds. The hardwood sprout growth from extensive firewood harvests in the 1980's, resulted in significant browse for food. This growth needs to be cut off at the stump to reestablish lush sprout growth as a renewed food source. Winter protection from deep snows and a food and water source within and adjacent to this stand makes this area a valuable deer yard.

This property contains a significant volume of red oak, a critical mast tree for a host of wildlife. This species should be retained in large diameter classes. These large trees are great mast producers and are important as a seed source to regenerate this species.

Beech is very prevalent in the northeast corner of Compartment # III. This species is an important mast producing tree. Beech nuts are favored by bear and other wildlife. Despite the extensive ice damage in this stand, large diameter beech with healthy crowns should be retained. Beech bark disease is also prevalent on much of the beech throughout the property. Any trees showing evidence of bear claw marks on the trunks of the trees should be retained as these are identified as good mast producers.

Snags and old growth decadent trees should be retained for their wildlife value. These potential cavity nesters provide ideal “Critter Condos” for woodpeckers and small mammals and birds such as squirrels, fisher, chickadees, and nuthatches. Wood ducks use these trees to raise their young. Den trees are very valuable near wetland areas.

Downed woody material is referred as “Coarse Woody Debris”. This is important for the maintenance of biodiversity as they provide habitat for nearly every group of organisms. Extensive WTH is not advisable throughout the property as this method of harvesting allows the complete utilization of this material. Large cull logs left on site provide den sites, shelter, food sources for bear who feed on the grubs in the logs as well as drumming sites for ruffed grouse.



Canadian Geese and Goslings
photo taken Spring 2006

Non-Current Use and Current Use Assessment Categories

I. Non-Current Use:

A. Compartment # II

- | | |
|---|------------|
| 1. Jail, Nursing Home and Farm Complex: | 13.0 acres |
| 2. County Administration Building: | 2.0 acres |
| 3. Power Line | 1.5 acres |

B. Compartment # III

- | | |
|---------------------------------|-----------|
| 1. County Superior Court House: | 4.0 acres |
| 2. Pump House Complex: | .5 acre |
| 3. Power Line: | 2.0 acres |
| 4. Access Road to Pump House: | .5 acre |
| 5. Cell Tower Structure: | .25 acre |
| 6. Service Road for Water Line | 1.0 acre |

II: Current Use Categories by Compartments:

A. Compartment # I

- | | |
|--------------|----------|
| 1. Hardwood: | 10 acres |
| 2. Other: | 44 acres |

B. Compartment # II

- | | |
|------------------|---|
| 1. White Pine: | 30 acres |
| 2. Hardwood: | 2 acres (area must be primarily red oak, yellow and white birch and or sugar maple to be classified as hardwood) |
| 3. Other: | 347 acres (this includes 20.4 acres of overgrown field full of hardwood and white pine saplings) |
| 4. Farm Land: | 79 acres (this is primarily hay land) |
| 5. Wetland/water | 15.4 acres |

C. Compartment # III

- | | |
|----------------|--|
| 1. White Pine: | 36 acres |
| 2. Other: | 282 acres |
| 3. Farm: | 11 acres (3.5 acres of hayfield and 7.5 acres of abandoned but not overgrown field as of yet) |

GRAND TOTAL CURRENT USE:

- | | |
|----------------|------------|
| 1. White Pine: | 66 acres |
| 2. Hardwood: | 12 acres |
| 3. Other: | 674 acres |
| 4. Wetland: | 15.4 acres |
| 5. Farm: | 90 acres |

Some Final Thoughts

The preparation of this forest stewardship plan has provided a great deal of enjoyment for me during my final year of employment as the Carroll County Extension Forester with UNH Cooperative Extension. I have gained renewed appreciation for the time that it takes to conduct an intensive timber cruise, map the landscape, write the plan and draft the forest type map. Plans are only as good as the implementation. I hope my successor finds this document useful in carrying on the work that has been accomplished by the four county foresters that have been engaged in the management of this very important and valuable county asset since 1942.

I want to share some thoughts regarding this property. Several have to do with potential income generating ideas and others with expanding the educational role of this property.

1. The first idea deals with the commercial production of Christmas trees. In reviewing the property, the logical spot that could be converted to this use is Field # 3 located in Compartment # III. This 5.7 acre field is beginning to overgrow with both hardwood saplings and white pine. It used to be pastured when the farm raised livestock. In the recent past, it was bush hogged to control the brush. This has not been done for the past few years and the encroachment of the forest is becoming quite evident. The following summary highlights the requirements to grow a commercially valuable Christmas tree crop:

It takes a minimum of 8-10 years to grow a saleable tree from seedling to a 6-7 foot product. You can plant about 1000 trees per acre at a spacing of 6' x 6'. The preferred Christmas tree variety is either balsam or fraser fir. Other species sold include white spruce, blue spruce and white fir. Small quantities of these varieties are recommended in order to satisfy a variety of customer tastes if you have a cut your own operation. If the focus is on wholesaling large quantities of trees then one should focus on the balsam fir and fraser fir varieties as they are the most popular.

The costs associated with a Christmas tree operation include labor, materials and equipment. I will elaborate on each of these:

The labor to produce a quality tree is spent on laying out and planting the seedling stock, spraying herbicides for controlling grass competition around the seedlings, mowing the grass between the rows three or four times a season, shearing the trees annually after about the third or fourth growing season following planting, liming and fertilizing trees if a soil test indicates that is necessary and treating for any insect and disease problems that surface throughout the rotation from planting to harvest. Cutting and delivering the trees if you wholesale the product to retailers are other expenses. On a cut your own operation, that expense is not incurred. Someone in the farm crew will have to get a pesticide license so that the person can apply the necessary pesticides and herbicides when necessary. Failure to perform all the essential cultural steps in the development of a quality product will result in a disaster and an end product that will not be saleable except as balsam fir brush for wreath production.

Material expenses include the cost of seedlings, lime, fertilizer, pesticides, herbicides for insect and weed control and fuel to run equipment.

Equipment expense includes hand planting tools, riding mower to control grass, shearing knives and hand clippers and a back pack hand pump sprayer.

If you look at the cost of establishing and producing one acre of saleable trees, the cost breakdown would be approximately as follows:

1.	1000 seedlings per acre	\$300-\$400	depending upon species, age & source
2.	Lime & Fertilizer	\$150	
3.	Labor to plant	\$250-\$350	You can plant about 500-600 trees/day. Prison help would not be a direct expense but the work would have to be closely supervised. Correct planting is crucial to success.
4.	Herbicide for grass control	\$150-\$200	
5.	Mowing the plantation 4-5 times/ year for 10 years	\$1200	\$30/acre * 4 times per year * 10 years
6.	Shearing the trees for about 6 seasons	\$3000	Shearing is critical to grow a quality tree. The farm crew would have to closely supervise the inmate crew.
7.	Insect & Disease Control	\$300-\$400	Only necessary if problems develop.
8.	Labor to harvest wholesale production	?	
Estimated total cost/acre		\$5350-\$5700	

Obviously, the above expenses can be reduced if competent inmate help can be trained to perform the critical cultural steps to produce a quality product. The estimated wholesale value of 1000 trees ranges between \$18,000-\$20,000 at today's prices. Cut your own prices, which is the direction I would suggest, generates about \$25-\$30 per tree or \$5-\$6 per foot. Thus this market is much more lucrative and generates about \$25,000-\$30,000 per acre or \$2500-\$3000 per year. One can anticipate about 10% of the trees that are planted will either die the first one or two years or just not develop into a quality tree and will either be culled out early into the rotation or be grown for balsam brush for wreath production. By virtue of the way trees grow, if you plant an acre's worth, the fastest growing genetically superior trees begin coming into production at about 8 years. This maybe as many as 20-30% of the 1000 trees planted. Another third come into production over the 9-10 year period and the remainder after 10 years.

Growing Christmas trees can be a very rewarding and financially successful venture. The success is directly proportional to doing all the cultural treatments necessary on an annual basis to produce a quality tree. Again, a poor looking product is not saleable in today's market. Skipping essential cultural practices during the 10 year rotation will jeopardize quality and render the end product inferior and unsaleable.

If the county farm wishes to pursue this activity, I would suggest taking this area of the property and planting about one acre per year. The second area in Compartment # III that could be devoted to this activity is Field # 2 containing about 2.5 acres.

2. The second idea that Field # 3 could be put to use is the leasing of this section for a wind farm. With the energy situation as it is, every conceivable alternative to oil will be explored and developed in the future. The use of turbines powered by wind will become a more attractive means of electrical generation.

3. I am enclosing a copy of a plan that has been developed that outlines a proposed Nature and Hiking Trail at the Carroll County Nursing Home. This wheel chair accessible trail would provide an opportunity for both mobile and immobile patients in the home to enjoy the out of doors. Perhaps a grant can be secured to cover the cost of creating the hardpacked trail that can accommodate wheel chairs the entire route totaling approximately 1950 feet. Along the route, a variety of attractions including the vegetable and fruit gardens, the pond, the honey bees and the vista of the mountains would provide some scenic beauty and variety for the patients to enjoy. (Appendix N).

4. This property can be utilized more extensively for educational field days and workshops. In the past, forestry field days, animal logging workshops and safe tree felling workshops for the Professional Logger Training Program have been conducted on the premises. This effort can be expanded. The trail system developed from past logging operations and the existing road system can be promoted for use by the general public for hiking, cross country skiing and for horse drawn wagon and sleigh rides.

5. For many years, a maple sugar producer has tapped and tubed sugar maple trees in Compartment # III. The area that is being tapped is along the entrance road off Route 171 that goes to the pump house and the hardwood stand south of Field # 3 and extending over to the maintenance road to the pump house. This producer should adhere to the latest tapping guidelines which ensure the trees will not be overtapped and injured. These guidelines were developed at the University of Vermont's Proctor Maple Research Center located in Underhill, Vermont. In summary, these guidelines call for not tapping trees until they reach a 12" diameter size at 4.5 feet off the ground (DBH). You can place one tap beginning at 12" and two taps at 19" and larger. The recommended maximum number of taps per tree is two. These guidelines should be shared with this maple producer. Also, the county should be leasing the taps at the current rate of 20 to 25 cents per tap as a payment for the use of county land for his private business. The average production of maple syrup from one tap is a quart of syrup valued at about \$12-\$15 per quart.

6. In order to make this plan a useful and productive document to guide the management activities on this property, the UNH County Extension Forester needs to work closely with the Farm Manager to implement the recommendations in this plan. An annual planning meeting between the two parties should take place and a specific project and or timber sale should be planned. This proposal is then taken to the County Commissioners for review and hopefully approval. All timber harvesting, including firewood, should be marked and conducted under the guidance of the County Forester. **I recommend that the firewood harvest be adjusted to about 150 cords per year for the next ten years.** At that time, (2016) a timber inventory should be performed to determine if this allowable cut will ensure a sustainable supply of this quantity of firewood.

7. My final thought that I would like to promote and encourage the Commissioners to seriously consider is the placement of a CONSERVATION EASEMENT on this property to ensure that it remains forever undeveloped and a productive tract of forest and farm land. With the rampant growth that this county is beginning to experience and which will only accelerate, it is crucial for the retention of the rural character of the county that this very productive acreage be kept out of development. The skyrocketing cost of land and the rapid fragmentation of our landscape is going to drastically alter rural New Hampshire as we know it today. As County Commissioners, it is within your power to permanently protect this acreage and ensure that it remains undeveloped and capable of providing the much needed food and fiber which society will need in the future. Maintaining our working landscape is an admirable goal that needs to be achieved. The Conservation Easement is the one tool that can achieve these results. Strafford County Commissioners have taken this very bold step in protecting their county lands. I strongly encourage the Carroll County Commissioners to take the same action. I cannot think of a nicer and more permanent legacy to your tenure as Commissioners. Every action you take and every decision you make has a fairly temporary lasting impact. Permanent protection of this land, on the other hand, is the most permanent decision you can make. Future generations will recognize you for this bold and courageous action. The rural character, which we all so cherish will be preserved and a very productive tract of land will be retained for both the food and fiber needs of society. PLEASE GIVE IT SOME SERIOUS THOUGHT!!!

Pictures of County Complex



Superior Court House
photo taken Spring 2006



County Jail
photo taken Spring 2006



County Nursing Home
photo taken Spring 2006



County Administration Building
photo taken Spring 2006

Glossary of Terms

BASAL AREA - a quantitative measure of density, usually expressed as square feet per acre, approximates the amount of tree stump area to be found per acre at breast height or 4.5 feet above the ground.

BIOMASS - the total mass of a tree, or stand, including the main trunk, branches, crown and foliage.

BOARD FEET (bf) - a measure of sawed lumber. A board measuring 1 foot long, 1 foot wide and 1 inch thick that contains 1 board foot, or 1 bf. See MBF.

CANOPY - the cover formed by the crowns of the individual trees.

CAPITAL GAIN OR LOSS - generally, the gain or loss realized on the sale or exchange of capital assets such as land, timber, buildings and equipment. Income received in this manner is treated differently for tax purposes than income received in the form of wages or salaries, or the profit realized from the operation of a business. In forestry, this is due to the growth of the trees. Only a percentage of the income derived from a timber sale is taxable because of capital gains.

CLEAR-CUT - this harvesting technique removes all timber products down to 2" in diameter. It is often useful in managing areas of low quality timber for improved regeneration as well as ending a rotation. Patch clearcuts remove timber in small, roughly circular areas. Strip clearcuts remove timber along 100 foot strips or other designated widths which usually cover much larger areas than a patch clear-cut.

COMPARTMENT - a forest area that is separate and unique from other areas because of predominant species composition in terms of volume of softwoods and hardwoods. Compartmentalization is used in forestry for mapping purposes and the statistical processing of forest data.

CONVENTIONAL LOGGING SYSTEM (CLS) - the use of a chainsaw and grapple or cable skidder to harvest trees from the forest.

CORD - a measure of forestry products such as firewood, pulpwood or fuelwood chips. The legal measure of a cord is a stack of 4 foot lengths of roundwood, 4 feet high, and 8 feet long with its air spaces, which measures 128 cubic feet of wood. In terms of solid wood, the standard is 90 cubic feet. Since mills often record pulp by its weight, the industry has developed standards for the conversion of weight to cords. Green hardwood approximates 5,100 pounds while green softwood is 4,400 pounds.

CROP TREE - a tree, due to species, potential, age, form and spacing, considered to be of high

economic value either now or in the future. The growth of such trees is made the object of frequent thinnings or other improvement cuts.

CROWN - upper part of the tree, including branches and foliage.

CROWN CLASSES OF FOREST TREES -

- A. **Dominant** - a tree whose crown receives full sunlight on the top and all sides.
- B. **Co-dominant** - a tree whose crown receives full sunlight on the top and indirect lighting on the sides.
- C. **Intermediate** - a tree whose crown and sides receive indirect lighting.
- D. **Suppressed** - a tree which has always grown in low light which has thwarted its growth.

CULL REMOVAL - the removal of trees of no economic value because of poor quality and/or large size. These are often a detriment to the overall vigor of the stand.

CURRENT USE ASSESSMENT - a legal designation of a parcel of land which restricts its taxable rate based upon its current use. This normally greatly reduces the tax burden to the landowner and encourages proper land management. This law is referred to as RSA 79-A and Chapter Rev. 1200 for current use.

CUT TO LENGTH (CTL) - a harvest system using a harvester/forwarder to cut trees and remove forest products in log length from the forest.

DBH - diameter of a tree at breast height or 4.5 feet above the ground.

DEPLETION UNIT - a calculable value of timber at the time of harvest which is deducted from the taxable income. Expressed as \$/MBF, it is based on the value of the timber at the time of purchase and the total volume of the lot at harvest. This value is known as the Depletion Unit Allowance.

DIB - diameter inside bark. The diameter of a tree without the bark, used in determining growth rate.

EPICORMIC BRANCHING - the sprouting of dormant buds from under the bark of the tree, on either the bole or limbs, due to environmental stress such as increased sunlight following harvesting, insect defoliation, disease or weakening of the tree.

EROSION - the usually destructive movement of soil particles, often associated with logging operations and access roads.

FUELWOOD THINNING - this harvesting technique improves a hardwood stand through the removal of weed and cull stems which can be used as fuelwood.

GROUP SELECTION HARVEST – this silvicultural prescription removes groups of trees about .25 to .5 acre in size and single trees between groups are removed. The system works best where the mature trees occur in clumps, and where some mixture of intolerant or intermediate species is desired in the regeneration.

HARVESTING TECHNIQUES - a variety of methods prescribed by foresters to best utilize the forest products. They include Conventional, Whole Tree Harvesting (WTH) and Cut To Length (CTL).

HARDWOOD - broad leaf trees that shed their leaves each fall. Tamarack is the one softwood that sheds its needles.

HIGH RISK TREE - a tree with a low probability of surviving until the next time. If an effort is not made to harvest this high risk tree, its value will likely be lost.

IMPROVEMENT CUT - a broad term used to describe a silvicultural practice designed to promote health, growth, and better stocking of crop trees as well as determining species composition.

INCLUSION - a small pocket of like species found within a forest stand that differs from the composition of the stand.

MBF - an abbreviation of the industry standard for saw timber, thousand board feet.

MANAGEMENT - the systematic approach to monitoring and assisting forest growth by professional foresters.

MEAN STAND DIAMETER (MSD) - the average DBH of all trees found within a specific area of the forest usually based upon trees 2" or 4" DBH and larger.

MERCHANTABLE MEAN STAND DIAMETER (MMSD) - average DBH of all trees found above a specific diameter usually 8".

MERCHANTABLE HEIGHT - the height of the commercially salable portion of the tree.

MULTIPLE USE - the management of the same area of forest land for several uses, such as hiking, wildlife habitat and timber production.

NECTRIA CANKER - a disease caused by a fungus in which bark and cambium are killed back in the autumn and winter months; the next year the tree grows callus tissue and in several seasons of this process, the canker on the tree has a target-like appearance. The canker itself often appears discolored and as a depression on the side of the tree's main trunk and sometimes the limbs.

OPTIMUM GROWTH - the greatest growth which can be achieved on a given site, usually in reference to timber volume.

OVERSTOCKED - a stand where all growing space is occupied, with no room for future development.

OVERSTORY REMOVAL - the harvest of trees left from previous harvests. These trees are generally older than the other trees, with their crowns in the overstory.

PLANTATION - an area planted with forest trees.

POCKET - a collection of timber with unique qualities which warrants discussion. This may be a small area of a single species, low quality pulp, or high quality sawlog which differs from the average. It is smaller than a stand.

POLE - greater than 4" in diameter but less than sawlog specifications

PULPWOOD - the portion of a tree not suitable for lumber which has economic value in the production of paper products or fuelwood.

REGENERATION - the natural or artificial restocking of an area with a new generation of trees

A. **Natural** - seedlings which have grown from seed stock of that area or sprouts from past cuttings.

B. **Artificial** - seedlings which have been introduced by hand or mechanical planting.

RLI - rings last inch: the number of annual rings occupying the outer one inch of growth of a tree. It is used to determine the rate of growth.

ROTATION - the period of years required to reproduce, grow and harvest a crop of timber under definite objectives of forest management.

SALVAGE CUT - the harvest of dying timber through natural or human causes which would be lost if left untouched.

SANITATION CUT - the harvest of diseased, weakened and insect infested trees and/or stands to prevent further infestation.

SAPLING - a young tree greater than 3' tall.

SAWLOG - the part of the tree which has economic value as sawed lumber.

SCARIFICATION - a method of disturbing the ground cover in preparation of natural or artificial regeneration.

SECTION - part of a stand which is geographically separated from the rest. It has the same characteristics as the other section which make up the stand.

SEEDLING - young trees up to 3' tall.

SEED TREE - a harvesting technique useful at the climax of a forest's growth. The majority of trees are harvested, while leaving the best to provide seed stock for regeneration.

SINGLE TREE SELECTION SYSTEM - this silvicultural prescription removes enough timber to retain a large quantity of good growing trees and creates an uneven aged stand.

SHELTERWOOD SYSTEM - the harvest system in which the smaller trees are removed leaving an overstory of larger trees to provide seed and shade for the new seedlings.

SILVICULTURE - the art and science of growing a forest.

SITE INDEX (SI) - the average total height of dominant and co-dominant trees within a stand at fifty years of age. The figure gives foresters an indication of the growth potential of particular site. It's based on the rate of growth and height of the resident trees.

SITE PREPARATION - methods used to prepare the forest for natural or artificial regeneration.

SIZE CLASS - the size, in inches, of the stand at any point in time, using the following code:

- A. **Sapling** - 1-4 inches DBH
- B. **Pole** - 5-7 inches DBH
- C. **Sawtimber** - 8 + inches in DBH

SLASH - the tree and shrub residue left after a logging, tsi, or cull removal operation which has no economic value unless the site has been whole tree chipped.

SOFTWOOD - coniferous or needle bearing trees also referred as evergreens. Tamarack is the only softwood which loses its needles each fall.

STAND - a finer breakdown of compartments. A hardwood compartment may have an area that is mostly red oak, while another area may be mostly white birch. These areas are considered separate stands within the same compartment.

STOCKING - the number of trees per acre using this code:

- A = overstocked
- B = fully stocked
- C = understocked

TIMBER SALE - the commercial removal of timber from the forest. Marking, supervision, administration and closure are all important components of a timber sale.

TIMBER STAND IMPROVEMENT (TSI) - the improvement of a young forest through non-commercial operations. These small trees will increase in growth and vigor, and thereby will increase their economic value. There are two methods:

- A. **Weeding and Thinning** - the removal of competing stems in an area to release crop trees and improve spacing for maximum growth.
- B. **Pruning** - the removal of all limbs from the main stem of designated crop trees, up to 17.5 feet. This increases the yield of clear lumber and value of the tree when it reaches maturity.

TIMBER TRESPASS - the unauthorized removal of timber from another's property. This is formally referred to as RSA: 539.

TOTAL HEIGHT - the linear distance from the ground to the top of the tree.

TREE FARM - an official designation by the American Tree Farm System. It signifies a commitment by the landowner to proper forestry practices. The tree farm brings recognition to the dedicated landowner that he is a responsible steward of his land.

VENEER - the highest grade of sawlog for certain tree species. Thin sheets of wood are sliced, sawed or rotary cut from the log to be used as facings on furniture, etc... Oak, maple and birch are common veneer species.

WATER BAR - a mound of dirt mechanically placed diagonally across a road or trail to divert run-off and prevent erosion. These are often placed on woods roads in steep areas as part of timber sale closure.

WHOLE TREE HARVESTING (WTH) - harvesting technology using a feller / buncher and grapple skidder to remove bunches of whole trees from the forest to the landing where they are converted into sawlogs, pulpwood and biomass fuelwood chips.



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