

Forest Inventory Information

The Coburn Hill 40 Acre Lot

Prepared for

Municipal Forests Committee
Town of Craftsbury
Orleans County
Vermont

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PURPOSE and SCOPE of this REPORT

The purpose of the following report is to provide information about the land and the forest conditions of a 40 acre Carter-Coburn woodlot owned by the Town of Craftsbury and managed by the Municipal Forests Committee. This report is developed as an answer to the Committee's request for more information from which a plan and strategy for future work can be developed.

Information is provided in two areas: first the ecological setting for the woodlot, and second, information to make management and silvicultural decisions for each of four stands.

The scope of the report is to provide a map in sufficient detail to identify the forest stands, and provide information from a forest inventory. The inventory was made in each of four stands to determine the density of the stand, the species composition, an estimate of the volume of timber. Information about natural communities is provided for each stand. This information is intended to be available to the Committee and to the citizens of Craftsbury for planning purposes.

LOCATION

The Coburn Hill 40 Acre Lot is located in the northeastern portion of the Town of Craftsbury, Orleans County, Vermont. It is on top of Coburn Hill, one mile west of Route 14. From the original Craftsbury Town layout it appears that this property is the southern most quarter of Lot 3 in Range 3. The layout was based on a town perimeter with square boundary, six miles on a side. This was subdivided by surveyor Samuel Craft into 144 square lots with .5 mile sides. The 12 ranges run from north to south, and each range has 12 lots which run from west to east. This Town property is only a portion of the original 160 acres, approximately 40 acres, and no recent land survey is available. A sketch was provided by James Moffat of the Committee from measurements obtained in the Craftsbury Land Records, Book 12, page 387, Book 14, page 25, and Book 25 page 38, and from Book 19, page 402, Augusta Paddock to Thomas Coburn on December 8, 1904. The sketch shows the lot is laid out as the southern one-quarter of the Lot 3, Range 3, and is 46 rods (759 feet) on the both of the shorter sides, and the north side, $101 + 32$ rods = 133 rods total (2194.5 feet), and the southern line, $112 + 26$ rods = 138 rods (2277 feet). A calculation of area from these figures shows 38.9+ acres.

BACKGROUND

Property Lines, Land Survey and Acreage

An inspection was made of all boundary lines, and some evidence of surveyors' blazes, old stone walls and wire fence was located, but it was very scant to non existent for long distances along the east and northern lines. Two corners were marked; the south east corner with an old axle and the south west corner with an iron pipe and surveyor's cap

labeled R. Bohlen, Registered Land Surveyor # 7. No pipes and rods were located in the other corners.

The south line is shared with Sweeney, the west with Wild Branch Logging, the north with Julian, Tanner and another, and to the east with Jarvis. Across the south east corner is Barbara Orlovski, a portion of the former Pinto and Yustin lot. For the purposes of this inventory, the boundary lines were considered to be the ones flagged in orange, and in most places this seemed to follow evidence or be reasonable.

Geological Information

This parcel of land lies just west of the exposure of the three kinds of bedrock according to the maps of the Vermont Geologic Survey:

- To the east the underlying bedrock is the Waits River formation, metamorphic bedrock formed over 350 million years ago, Ordovician era, as a sedimentary rock under the ocean, now a metasedimentary rock called quartzite.
- Underlying and to the west is Missisquoi Formation which is also metamorphic from sedimentary but is not as old. The Coburn Hill Lot is just to the west of the interface between these two bedrock formations. Also bedded between these two types of bedrock are a thin sliver of Northfield Slate and the Shaw Mountain Formation, an old rock containing early fossil discoveries.

The Waits River Formation has higher calcium content than the bedrock to the west. This is significant for two reasons. First, in the microcosm, it means that the soils and hence the plant communities on them have available calcium from a slowly decomposing source, the bedrock.

Research in New Hampshire indicates that up to fifty percent of the calcium in the soils of the northeast may have been lost in 30 years from acidic precipitation. The most vulnerable places are plant communities at higher elevations on bedrock with little available calcium: granites, gneiss and schists. The good news is that this property is on the other end of the scale and has some calcium. This is important because tree growing sites where there is calcium are more productive. Scientists have speculated that the long term sustainability of human life will be tied to the retention or loss of soil calcium. In more specific terms, Cornell University discovered that the declining populations of Wood Thrush are due to thinning of their egg shells which in turn is the result of loss of calcium in the forest ecosystem.

In answering the questions regarding the plant communities on the Coburn Hill Lot, this interface of a high calcium bedrock may play a major role in dividing the northern hardwood community and an enriched northern hardwood community.

The surficial geology is important, and in the process of glaciers melting, the parent materials that would become the soils were deposited. Soils that were from the melting ice dropping its load of rocks, sand, silts and clay directly onto bedrock are called glacial till. Those that were developed from materials that were deposited under glacial lakes are called glacio-lacustrine soils, and those that were developed from material transported and deposited by glacial meltwater are called alluvial and outwash soils. There are

glacio-lacustrine and alluvial soils in the Black River valley to the east, but all the soils on this 40 acre parcel are from glacial till origins.

Soils

The soils are mostly fine sandy loams and silt loams. Descriptions of the soils are written below, and this information is provided by soil scientists from the Orleans County Natural Resources Conservation Service, US Department of Agriculture, 59 Plaza, Suite 12, Newport, VT 05855. The number preceding the soil is the mapping number, found on their aerial photos, # 48-45 and used to identify soil types.

A soil type is an area where the soils are of similar composition, origin and character, and they are named for the places where the soil was first studied. Cabot soil is silty, often very stoney and wet, while Lyman is seldom more than 6 inches deep and dominated by cliffs and bedrock exposures; Buckland is where we would all prefer to have a garden. permeability in the substratum.

There are two ways to measure the growing conditions and potential for future tree growth; they are: to use the soils information, and to make measurements in the woods called site index. In this inventory the site information is taken from soils. Both ways lead to a ranking of site conditions and potential into four classes: Site I is excellent, Site II is good, Site III is fair, and Site IV is poor. The soils on the Coburn Hill lot have the full range of site from I to IV.

59B and 159B CABOT SILT LOAM, 0 TO 8 PERCENT SLOPES, VERY STONY

Cabot Soils are formed from loamy, compacted glacial till on uplands. They are very deep to bedrock, but shallow to a hardpan and poorly drained. These soils have a perched seasonal high water table at depths of 0 to 2.0 feet below the surface. Permeability is moderate in the solum and slow or very slow in the substratum. Cabot soil is poorly suited to cultivated crops, hay and pasture because of the stones and boulders on the surface and the seasonal high water table. The soil is Site II due to wetness, but can grow trees fairly well.

There are two places where Cabot soil is located; just west of the ledges, and all of Forest Area 1.

88D LYMAN-ROCK OUTCROP COMPLEX, 15 TO 35 PERCENT SLOPES, VERY STONY

Lyman soils formed in loamy glacial till on uplands. They are shallow to bedrock and somewhat excessively drained. There is often windthrow as trees have shallow anchorage. Permeability is moderately rapid, leading to very dry soil conditions in periods of little precipitation. Rock outcrops and shear cliffs are common. This soil is Site IV, and forms a north-south band on the eastern side of the property that are the cliffs and the Spruce Knob.

12C TUNBRIDGE-LYMAN COMPLEX, 8 TO 15 PERCENT SLOPES, VERY ROCKY

These soils formed in loamy glacial till on uplands, and are composed of two soils that are so intertwined as to make it difficult to accurately map them, so they are considered together as a soil complex. Tunbridge soils are moderately deep to bedrock and well drained. Permeability is moderate or moderately rapid. Lyman soils are shallow to bedrock and somewhat excessively drained. Permeability is moderately rapid. This soil complex is poorly suited to cultivated crops, hay and pasture because of the stones and boulders on the surface and the rock outcrops. There are only a few acres of this soil, located east of the pine plantation and west of the Cabot soils; it is a thin band of soil that grades into a deeper soil to the west, described as Tunbridge-Dixfield, the best tree growing soil on the parcel. Tunbridge which dominates the conditions is Site I soil, and Lyman which is virtually not existent in this area is Site IV. For planning purposes it is suggested that this small area be considered all Site I.

Tunbridge-Lyman also lies east of ledges in the northern hardwood section of the forest; here again it is considered Site I.

101 B TUNBRIDGE-DIXFIELD COMPLEX, 8 TO 15 PERCENT SLOPES, VERY STONY

Tunbridge soils formed in loamy glacial till and Dixfield soils formed in loamy, compact glacial till on uplands. Tunbridge is moderately deep to bedrock and well drained. Permeability is moderate or moderately rapid, whereas Dixfield soils are very deep to bedrock, moderately deep to a hardpan, also called dense basal till, and moderately well drained. These soils have a perched seasonal high water table at depths of 1.5 to 2.5 feet below the surface. Permeability is moderate in the solum and moderately slow to slow in the substratum. This soil complex is poorly suited to cultivated crops, hay and pasture because of the stones and boulders on the surface, but is an excellent for tree growth, Site I. It is composed of soils with a seasonal high water table at various depths. This soil lies under the plantation of white pine east of the road, and contains only a few acres on this property.

Watershed

The watershed drainage of the property flows to the east and down a small unnamed brook to the Black River. The Black River flows north to Lake Memphramagog, and to the St. Lawrence via the St. Francis River. The area from the Coburn Hill Road drains west via road ditches and overland flow to a small stream that empties into the Wild Branch of the Lamoille River, to Lake Champlain and north to the St. Lawrence via the Richelieu River.

Wetlands

The maps of the National Wetland Inventory indicate no wetlands on the property. The National Wetlands Inventory of the US Fish and Wildlife Service inventoried and mapped wetlands nationally, and the federal laws regulating wetlands followed. Permits are required for certain uses, Conditional Use Permits, and other uses are regulated or prohibited. However, on the Coburn Hill property there are no operations planned that

will impact wetlands and normal silvicultural work is exempt from regulation. Building roads near wetlands might need a Conditional Use Permit.

The only exception to this finding is that Cabot Soil is often considered a hydric soil and a wetland. The conditions of these soils would need to be evaluated to determine if the Cabot soils are wetlands. Some of the indicators show that the Cabot soils west of the ledge would be considered legally designated wetlands.

Natural Heritage Information

A check of the maps developed by the Non-game and Natural Heritage Program of the Vermont Department of Fish and Wildlife, Agency of Natural Resources, indicates there are no rare, endangered or uncommon species known on the Coburn Hill property. It does indicate that there is or was a heron rookery about one-half mile to the north.

Biophysical Regions of Vermont and of the Coburn Hill Property

Biophysical regions organize the landscape into smaller units that share features of climate, geology, topography, soils, natural communities, and human history. Past and present geologic processes have set the stage and greatly influence the kinds of natural communities and human activities that occur in Craftsbury and across Vermont. An interesting comparison of this effect is found in the writer's experience in living at nearly 2000 feet in elevation in both New Hampshire and the Adirondacks, where growing gardens was not possible because of soil limitations, and topography. At the same elevation in Vermont, the Cabot Plains area, corn and alfalfa are grown because of the rich soils and the calcium bearing Waits River formation bedrock, even at this higher elevation. Although each region has variation within it, all biophysical regions are widely recognized as units that are more similar than they are different. In 1998, the Vermont Monitoring Cooperative supported a research project with the goal of delineating the biophysical regions in Vermont. The process of determining biophysical regions involves the integration of data from a variety of biological and physical resources.

Some of the variables used to delineate the biophysical regions include:

- Latitude and longitude
- Plant and animal species present
- January and July maximum and minimum temperatures
- Annual precipitation
- Bedrock geology, mineralogy and origin
- Length of growing season

The characteristics of the biophysical regions in Vermont are described in detail in the book, Wetland, Woodland and Wildland by Elizabeth H. Thompson and Eric R. Sorenson, published in 2000 by the Nature Conservancy and the Vermont Department of Fish and Wildlife. The following information was gathered primarily from this source. The results of this study described and mapped eight distinct biophysical regions of Vermont. The Craftsbury Town Woodlot on Coburn Hill is in the western edge of the

Northern Vermont Piedmont biophysical region, with the Northern Green Mountains biophysical region to the west.

Northern Vermont Piedmont

The Northern Vermont Piedmont is a hilly region dissected by many small rivers. For the more northerly part it is "where the rivers flow north". The climate of the Northern Vermont Piedmont is a moderate climate in relation to other areas in Vermont. It is cooler and moister than the Champlain Valley but warmer and drier than the Green Mountains or the Northeastern Highlands. Its growing season ranges from 130 at lower elevations to 110 days at higher elevations. Annual precipitation ranges from 52 inches in the highlands to 36 inches at lower elevations.

The metamorphic bedrock found in the Northern Vermont Piedmont originated as marine sediments. Some of the higher peaks are composed of hard granite exposed due to erosion of overlying softer rock. Granite quarries, including the famous Barre granite, are common in this region. Glacial till deposits can be found here as well as fine-textured sediments from glacial lake deposition. Many areas have soils rich in calcium derived from the marine limestone. These soils support specific types of natural communities and promote farming and development in particular areas. The process of erosion has smoothed former high mountains into the gentler hills of the piedmont. Knox Mt. (3,086) is the highest elevation in this region. The lowest elevations occur in river and stream valleys for example along the Connecticut River on the eastern boundary.

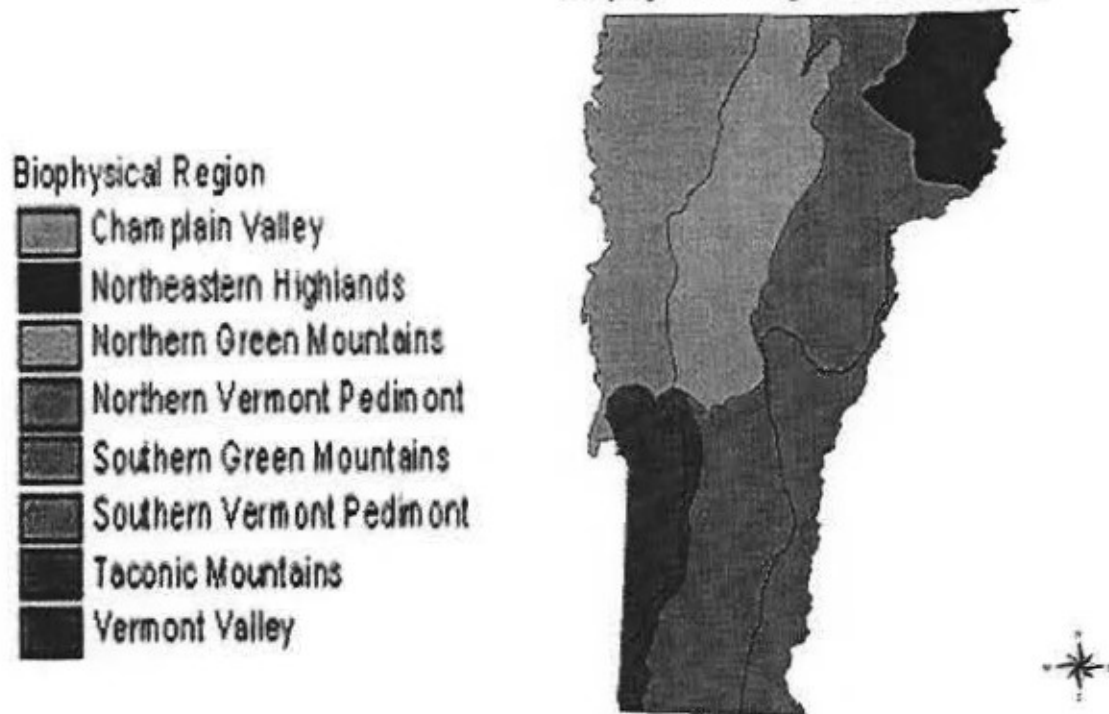
The Northern hardwoods forest dominates the natural community types of the Northern Vermont Piedmont. Areas with calcium-rich bedrock have a significant effect on local vegetation and community types. Road networks tend to fragment natural habitats and movement corridors yet many mammals are still commonly found in this region including white-tailed deer, beaver, coyote, fox, otter, mink, squirrels, and other rodents. Moose are abundant in the north and turkeys frequent the south, and becoming in Craftsbury in the past ten years. Common loons are an important nesting species in remote lakes.

Few Native Americans utilized this region prior to European settlement. Most settlements occur along river valleys where small farms are abundant. Forestlands are managed for timber production. Archeological data was gathered prior to the building of school buildings in Albany, 7 miles away, and Coventry, 21 miles away. A Paleo Indian point was found in Salem Pond, near Derby and 26 miles to the north northeast.

The natural vegetation of the region was dominated by northern hardwoods, and hemlock with northern hardwoods. After clearing for agriculture and logging, the natural vegetation has been altered, and the succession of the natural plant communities often set back to more pioneer species or altered by grazing. An interesting example of the latter's effects is in the abundance of spruce and fir stands in Craftsbury that are on soils which were originally northern hardwoods. This conversion was caused by cows grazing pastures that were seeding back to softwoods such as spruce, fir, cedar and pine, as well

as hardwoods like sugar maple, yellow birch, cherry, ash and beech. The cows ate the hardwoods leaving the softwoods to grow, and leading to present softwood stands that are slowly converting back to hardwoods naturally. Hence it is often important on a changed landscape to look to natural community typing when determining what plant community that would be present if only natural disturbances occurred. Present conditions tend to develop into natural communities that can be predicted. For example, the plantation, Forest Area 2 contains planted white pine and spruce, and lots of red maple, but from soils information, Tunbridge and Dixfield soil types tend to develop into Northern Hardwoods and Northern Hardwoods with Hemlock. Eventually they will.

Biophysical Regions in Vermont



Natural Communities

In their book, Wetland, Woodland, Wildland, A Guide to the Natural Communities of Vermont, authors Elizabeth Thompson and Eric Sorenson provide the following definition and explanation. "A natural community is an interacting assemblage of organisms, their physical environment, and the natural processes that affect them." The dynamic functioning of natural communities involves water flowing through them, nutrients cycling from the soils through plants and animals, natural disturbances such as windstorms and fire, succession and changes, and the building of organic detritus. Bedrock geology and soils often have significant influence on what natural communities will develop there.

All of stands in the Coburn Hill lot have been affected by natural disturbances, and most have changed from human intervention, logging, possibly fire, and most dramatically, the clearing for agricultural production and later abandonment.

In determining the natural communities for the property, the ways established in the Thompson and Sorensen book were used, as were training materials supplied by Elizabeth Thompson for field workshops in 1998 in Greensboro and Craftsbury. Of great help was a publication of the USDA Natural Resources Conservation Service in Colchester, Vermont, March 2004, which correlates the plant communities described in Wetland, Woodland, Wildland with soil types. It also provides a list of characteristic trees of the community, and, understory species that are associated with each soil series, based on those identified with each natural community in the book, and the authors consider it a work in progress.

The present plants in the understory and overstory of each stand were examined, as were soils and bedrock geology. This was done for each of the stands on this property, and the data is presented by stands. Special attention was paid to the understory herbaceous plants with an interesting, and unexpected conclusion. This conclusion is that most of the natural community is variants of northern hardwoods, with more red maple, spruce, fir, hemlock and black ash on Cabot soils. The most interesting find is that the understory plants below the ledge on the far eastern side of the property are indicative of an enriched northern hardwood forest. These indicator plants include maiden hair fir and blue cohosh, usually found in the enriched northern hardwoods on the Waits River Formation just to the east. It may be that the coolness of the east facing slope, and the presence of some calcium in the cliff may have created a unique niche for this community.

Information is presented for each of the four forest stands as a natural communities beginning on page 13. An interesting aspect of the communities that is not addressed in the Thompson and Sorensen book is the wildlife in the communities, and for an approach to birds, a program of Cornell Laboratory of Ornithology at Cornell University is recommended... It is called the "Birds of the Northern Forest Program" and involves setting up transects in the forest to determine the presence, and eventually the range and frequency of specific species of birds in the northeast. A contact is Jim Lowe of the Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY 14850.

Forest Health

Although there were a few windthrown trees, and balsam fir with trunk decay, no forest health problems were threatening at this time. Several fungi were noted which cause decay in hardwoods; they are *Inonotus obliqua* on yellow birch, Hypoxylon canker on aspen, and *Poria*, *Ganoderma applanatum* and *Oxyporus populinus* on maples. Most of the beech are infected with Beech Bark Disease, a combination of an insect, Beech Scale and a *Nectria* fungus. Some larger hemlock had sapsucker holes on the bark, often an indication of internal ring shake.

Forest Tent Caterpillar populations are on the increase and may affect the hardwoods.

Forest Inventory

The forest was inventoried with a sampling system using measured plots in the woods. The field data was entered into a software program, Cruisesheet 1.2 from Noble and Noble Forestry. The inventory involves placing the plots in a systematic sampling pattern, and then measuring the trees in each plot. From the sampling information, a projection is made to determine information for the whole property. One-thousandth acre plots were used systematically and randomly to sample the understory plants.

Four charts are presented for each stand from this projection to provide information about the forest from the inventory; each is set up by species of trees and two-inch diameter classes. They are:

1. **Basal Area Summary** which shows the density of trees. Basal area is the number of square feet in the cross sections of trees per acre. Knowledge of basal area helps forest managers to understand when the forest is too dense for individual trees to grow, and how much to remove in harvesting wood.
2. **Trees per Acre Summary** shows the different species of trees by diameter groups on an average acre.
3. **International ¼ Log Rule for Sawlogs** shows the number of board feet per acre for species on an average acre by diameter groups. A thousand board feet is the amount of wood that is used in market transactions.
4. **Pulpwood and Firewood Volume Summary** shows the volumes of pulp and firewood per acre by species and diameter class. This volume is expressed in cords; this is not the chords of two or more harmonious notes played together, rather 128 cubic feet of wood, bark and air, stacked in a manner suitable for sale. One way to stack a cord is in a pile 4 feet high, 4 feet wide and 8 feet long. Of the 128 cubic feet in a cord, about 80 to 95 cubic feet is wood, more with softwoods, and less with hardwoods.

INVENTORY INFORMATION BY FOREST STANDS

On the following pages, Inventory Information for making Silvicultural Decisions is presented by stand or Forest Area in a format that will be helpful to the committee for further planning work. Silvicultural Guides and decision-making models for Northern Hardwoods and for White Pine are available from the US Forest Service. These guides use the inventory data provided to make silvicultural decisions, and to time the treatments. Helpful literature might include:

1. **Thinning in the Maine Forest – Conference Proceedings**, 1999, Cooperative Forestry Research Unit of the University of Maine, Orono
2. **A Silvicultural Guide for Northern Hardwoods in the Northeast**, 1969, Leak, Solomon and Filip USDA US Forest Service, Research Paper NE-143
3. **Crop Tree Management in Eastern Hardwoods**, Perkey, Wilkins and Clay, USDA, US Forest Service, NA-TP-19-93
4. **Habitat Mapping and Interpretation in New England**, 1982, Leak, USDA US Forest Service, NE Research Paper NE-496
5. **New Perspectives on Silvicultural Management of Northern Hardwoods – Proceedings of Symposium....**, USDA US Forest Service, General Technical Report NE-124
6. **Applied Ecosystem Management on Nonindustrial Forest Land**, 1997, Leak et al, USDA US Forest Service, General Technical Report NE-239
7. **A Silvicultural Guide for White Pine in the Northeast**, 1978, Lancaster and Leak, USDA US Forest Service, General Technical Report NE-41

Following are four pages titled in bold with the name of each forest area, one for each forest area; following each page are the four charts for each stand. In sum these four charts form the inventory data requested for silvicultural decision making and managing these stands. These four pages can be seen as work sheets, partially filled in with information from the inventory.

FOREST AREA 1 Coburn West Mixed Woods

TECHNICAL INFORMATION

Area: 15.2 Acres
Forest Cover Type: Spruce-Fir with Hemlock and Hardwoods
Stocking Level:

Basal Area:

Total Growing Stock: 96.7
Acceptable Growing Stock: 58.4

Trees Per Acre: 280

Natural Community:

Overstory Species Composition:

Balsam fir 24.1%, Spruces 6.9%, Hemlock 3.4%, Red Maple 13.8%, Yellow Birch 3.4% and Sugar Maple 3.4%, White Ash 3.4, Beech 1.7 and unacceptable Growing Stock for Sawtimber 39.6%

Understory Species:

Clintonia, Canada Mayflower, Star flower, Indian Cucumber, Pink Lady Slipper, wood sorrel, goldthread, hobblebush, sarsaparilla, sedges, horsetails and bunch berries.

Soils: Cabot Soils

Natural Community Designation: Uncertain, as the community most likely over a long time is probably a wet variant of Northern Hardwoods with Hemlock, page 148m but for now it is likely an upland spruce-fir mix with red maple, black ash and hardwoods page 115. The NCRS document

Reference: to pages 148 and 115 in Wetland, Woodland, Wildland by Thompson and Sorensen

Coburn West Mixed Stand on Cabot Soil Basal Area Summary (square feet/acre)

Coburn West Mixed Mean 96.7 St Dev 33.4 CV 34.5 Std Err 9.6 Cl at 95% 21.2 Cl at 85% 14.9 Cl at 75% 11.7

DBH 4.5 ft	ALL	B Fir	Spruce	Hemlock	R Maple	Y Birch	S Maple	W Ash	Beech	Unaccept.
6	26.7	10.0	1.7		5.0					10.0
8	31.7	10.0	3.3		1.7		1.7			15.0
10	16.7	3.3			3.3	1.7	1.7	1.7	1.7	3.3
12	11.7		1.7		1.7	1.7		1.7		5.0
14	5.0			1.7	1.7					1.7
16	5.0			1.7						3.3
Total	96.7	23.3	6.7	3.3	13.3	3.3	3.3	3.3	1.7	38.3
Percent	100.0	24.1	6.9	3.4	13.8	3.4	3.4	3.4	1.7	39.6

Coburn West Mixed Trees Per Acre Summary

Coburn West Mixed Mean 280.2 St Dev 72.3 CV 25.8 Std Err 20.9 Cl at 95% 45.9 Cl at 85% 32.3 Cl at 75% 25.3

DBH 4.5 ft	ALL	B Fir	Spruce	Hemlock	R Maple	Y Birch	S Maple	W Ash	Beech	Unaccept.
6	135.6	50.9	6.5		25.5					50.9
8	90.7	28.6	9.5		4.8		4.8			43.0
10	30.6	6.1			6.1	3.1	3.1	3.1	3.1	6.1
12	14.9		2.1		2.1	2.1		2.1		6.4
14	4.7			1.6	1.6					1.6
16	3.6			1.2	1.2					2.4
Total	280.2	85.7	20.2	2.8	40.0	5.2	7.8	5.2	3.1	110.3

Coburn West Mixed International 1/4 Inch Volume Summary (board feet/acre)

Coburn West Mixed

DBH 4.5 ft	ALL	B Fir	Spruce	Hemlock	R Maple	Y Birch	S Maple	W Ash	Beech	Unaccept.
10	134.5	134.5								
12	208.0				67.9	67.9		72.2		
14	237.0			115.4	121.6					
16	70.4			70.4						
Total	649.8	134.5		185.8	189.5	67.9		72.2		

Coburn West Mixed Pulp Volume Summary (cords/acre)

Coburn West Mixed

Mean 15.2 St Dev 6.6 CV 43.3 Std Err 1.9 CI at 95% 4.2 CI at 85% 2.9 CI at 75% 2.3

DBH 4.5 ft	ALL	B Fir	Spruce	Hemlock	R Maple	Y Birch	S Maple	W Ash	Beech	Unaccept.
6	2.6	1.3	0.1			0.4				1.0
8	5.1	1.7	0.5			0.2		0.3		2.3
10	3.2	0.5				0.7	0.3	0.3	0.3	0.7
12	2.2		0.4			0.3	0.3	0.3		1.0
14	0.7			0.2		0.2				0.4
16	1.2			0.3						0.9
Total	15.2	3.6	1.0	0.5	1.7	0.6	0.7	0.6	0.3	6.2

Produced by: Ross Morgan
Cruise Sheet 1.2 © 2002

FOREST AREA 2 Plantations

TECHNICAL INFORMATION

Area: 13.0 Acres
Forest Cover Type: White pine, white spruce plantations with red maple

Stocking Level:

Basal Area:

Total Growing Stock: 88.9

Acceptable Growing Stock: 62.2

Trees Per Acre: 163.8

Natural Community:

Overstory Species Composition:

White Pine 78%, Red Maple 9.8%, and unacceptable Growing Stock for Sawtimber 12.2%

Understory Species:

Aspen, red maple and raspberries, goldenrod, and balsam fir and white pine seedlings.

Soils: Tunbridge-Dixfield and Tunbridge-Lyman

Natural Community Designation: Northern Hardwoods

Reference: to page 132 in Wetland, Woodland, Wildland by Thompson and Sorensen

Coburn Plantation Basal Area Summary (square feet/acre)

Coburn Plantation Mean 82 St Dev 34 CV 41 Std Err 11 CI at 95% 24 CI at 85% 17

DBH 4.5 ft	ALL	White Pine	Red Maple	Unaccept.
6	8		2	6
8	10	6	2	2
10	26	20	4	2
12	18	18		
14	16	16		
16	2	2		
18	2	2		
Total	82	64	8	10
Percent	100.0	78.0	9.8	12.2

Coburn Plantation Trees Per Acre Summary

Coburn Plantation Mean 157.5 St Dev 101.7 CV 64.5 Std Err 32.2 CI at 95% 72.7 CI at 85% 50.6

DBH 4.5 ft	ALL	White Pine	Red Maple	Unaccept.
6	40.7		10.2	30.6
8	28.6	17.2	5.7	5.7
10	47.7	36.7	7.3	3.7
12	22.9	22.9		
14	15.0	15.0		
16	1.4	1.4		
18	1.1	1.1		
Total	157.5	94.3	23.3	40.0

Coburn Plantation International 1/4 inch Volume Summary (board feet/acre)

DBH 4.5 ft	ALL	White Pine	Red Maple	Unaccept.
10	862	708	154	
12	1273	1273		
14	1703	1703		
16	188	188		
18	281	281		
20				
Total	4308	4154	154	

Coburn Plantation Pulp Volume Summary (cords/acre)

Coburn Plantation Mean 9.8 St Dev 4.3 CV 44.3 Std Err 1.4 CI at 95% 3.1 CI at 85% 2.2

DBH 4.5 ft	ALL	White Pine	Red Maple	Unaccept.
6	0.7		0.2	0.5
8	1.4	0.6	0.3	0.3
10	3.5	2.7	0.5	0.3
12	2.2	2.2		
14	1.6	1.6		
16	0.2	0.2		
18	0.2	0.2		
Total	9.8	7.7	0.9	1.1

FOREST AREA 3 Red Maple and Pioneer Hardwoods

TECHNICAL INFORMATION

Area: 7.8 Acres
Forest Cover Type: Red Maple with northern Hardwoods
Stocking Level:

Basal Area:
Total Growing Stock: 71.4
Acceptable Growing Stock: 31.4

Trees Per Acre: 181

Natural Community:

Overstory Species Composition:

Red Maple 14%, Sugar Maple 4%, Yellow Birch 4%, White Birch 4%, Aspen 2%, Cherry 2%, White Ash 6%, Spruce 4.3%, Fir 2% unacceptable Growing Stock for Sawtimber 56%

Understory Species:

Foamblower, red spruce, balsam fir, red maple, sarsaparilla, wild oats, claytonia, Indian cucumber, Canada may flower, horsetails, cowslips and nut sedge in wet areas of Cabot soil, cinnamon and interrupted ferns. Hazel, ciborium, buttercup and ovens

Soils: Tunbridge-Lyman soil

Natural Community Designation: Northern Hardwoods

Reference: to pages 132-137 and 148-149 in Wetland, Woodland, Wildland by Thompson and Sorensen

Coburn Forest Area 3 Basal Area Summary (square feet/acre)

Coburn Forest Area 3 Mean St Dev CV Std Err CI at 95% CI at 85% CI at 75%
 71.4 12.1 17.0 4.6 11.2 7.6 5.8

DBH 4.5 ft	ALL	Red Maple	S Maple	Y Birch	W Birch	Aspen	Cherry	W Ash	Spruce	B Fir	Unaccept
6	11	4		1					1	1	3
8	27	4		1	1		1		3	1	13
10	14				1					1	11
12	7	1				1					4
14	9			1						1	6
16	3										3
Total	71.4	10.0	2.9	2.9	2.9	1.4	1.4	4.3	4.3	1.4	40.0
Percent	100	14	4	4	4	2	2	6	6	2	56

Produced by: Ross S. Morgan
 Cruise Sheet 1.2 © 2002

Coburn Forest Area 3 Trees Per Acre Summary

Coburn Forest Area 3 Mean St Dev CV Std Err CI at 95% CI at 85%
 181.3 57.7 31.8 21.8 53.4 36.0

DBH 4.5 ft	ALL	Red Maple	S Maple	Y Birch	W Birch	Aspen	Cherry	W Ash	Spruce	B Fir	Unaccept
6	58	22		7					7	7	15
8	78	12		4	4	4	4	4	8	4	37
10	26					3				3	21
12	9	2				2					5
14	8			1						1	5
16	2										2
Total	181	36	11	5	7	2	4	4	15	14	85

Produced by: Ross S. Morgan
 Cruise Sheet 1.2 © 2002

Coburn Forest Area 3 International 1/4 Inch Volume Summary (board feet/acre)

DBH 4.5 ft/ALL	Red Maple	S Maple	Y Birch	W Birch	Aspen	Cherry	W Ash	Spruce	B Fir	Unaccept
10	149				55			94		
12	193	58			135					
14	281		104						176	
40										
Total	623	58	104	104	55	135		94	176	

Coburn Forest Area 3 Pulp Volume Summary (cords/acre)

Mean 11.5 St Dev 2.7 CV 23.3 Sld Err 1.0 C: at 95% 2.5 C: at 85% 1.7

DBH 4.5 ft/ALL	Red Maple	S Maple	Y Birch	W Birch	Aspen	Cherry	W Ash	Spruce	B Fir	Unaccept
6	1.0	0.3	0.2				0.2	0.1		0.1
8	4.2	0.8	0.3	0.2	0.2	0.2	0.5	0.3		1.8
10	2.8				0.2			0.2		2.4
12	1.4	0.2			0.1					1.0
14	1.5		0.2						0.1	1.2
16	0.7									0.7
Total	11.5	1.3	0.5	0.4	0.4	0.1	0.7	0.6	0.1	7.3

Produced by: Ross S. Morgan

FOREST AREA 4 Enriched Northern Hardwoods

TECHNICAL INFORMATION

Area: 4.0 Acres
Forest Cover Type: Enriched Northern Hardwoods
Stocking Level:

Basal Area:
 Total Growing Stock: 89
 Acceptable Growing Stock: 63

Trees Per Acre: 164

Natural Community:

Overstory Species Composition:

Sugar Maple 37.5, Yellow Birch 7.5% and Beech 8.7%, White Ash 8.7, Hornbeam 5%, Aspen 2.5% and unacceptable Growing Stock for Sawtimber 30%

Understory Species:

Maidenhair fern, New York Fern, blue cohosh, sugar maple, White Ash, Basswood, sweet cicely, Christmas fern, Basswood and baneberry

Soils: Tunbridge

Natural Community Designation:

Enriched Northern Hardwoods

Reference: to pages 140-143 in Wetland, Woodland, Wildland by Thompson and Sorensen

Coburn Enriched Hardwoods International 1/4 Inch Volume Summary (board feet/acre)

Mean 3180.1 St Dev 1755.802 CV 55.213 Std Err 585.267 Cl at 95% 1349.6 Cl at 85% 931.9 Cl at 75% 725.9

DBH 4.5 ft.	ALL	S Maple	Y Birch	Beech	W Ash	Hornbeam	Aspen	Unaccept
10	431.9	171.1	85.6	89.6	85.6			
12	655.4	316.9	90.5		158.5		274.4	90.5
14	1057.1	527.0						255.7
16	687.6	493.4						194.2
18	347.1	347.1						
Total	3180.1	1855.5	176.1	89.6	244.0		274.4	540.4

Coburn Enriched Hardwoods Pulp Volume Summary (cords/acre)

Mean 13.3 St Dev 2.854 CV 21.416 Std Err 0.951 Cl at 95% 2.2 Cl at 85% 1.5 Cl at 75% 1.2

DBH 4.5 ft.	ALL	S Maple	Y Birch	Beech	W Ash	Hornbeam	Aspen	Unaccept
6	0.5		0.2	0.1		0.2		
8	3.3	0.8		0.3	0.5	0.4		1.3
10	3.2	1.2	0.3	0.7	0.3			0.5
12	2.0	0.5	0.4		0.3			0.8
14	2.4	1.1					0.2	1.1
16	1.7	0.9						0.7
18	0.3	0.3						
Total	13.3	4.9	0.9	1.1	1.2	0.6	0.2	4.4

Coburn Enriched Hardwoods Basal Area Summary (square feet/acre)

Mean		St Dev	CV	Std Err	CI at 95%	CI at 85%	CI at 75%	
88.9		17.638	19.843	5.879	13.6	9.4	7.3	
DBH 4.5 ft	ALL	S Maple	Y Birch	Beech	W Ash	Hornbeam	Aspen	Unaccept
6	5.6		2.2	1.1		2.2		
8	21.1	4.4		2.2	3.3	2.2		8.9
10	17.8	6.7	2.2	4.4	2.2			2.2
12	13.3	4.4	2.2		2.2			4.4
14	16.7	7.8					2.2	6.7
16	11.1	6.7						4.4
18	3.3	3.3						
Total	68.9	33.3	6.7	7.8	7.8	4.4	2.2	26.7
Percent	100.0	37.5	7.5	8.7	8.7	5.0	2.5	30.0

Coburn Enriched Hardwoods Trees Per Acre Summary

Mean		St Dev	CV	Std Err	CI at 95%	CI at 85%	CI at 75%	
163.8		34.721	21.189	11.574	26.7	18.4	14.4	
D3H 4.5 ft	ALL	S Maple	Y Birch	Beech	W Ash	Hornbeam	Aspen	Unaccept
6	28.3		11.3	5.7		11.3		
8	60.5	12.7		6.4	9.5	6.4		25.5
10	32.6	12.2	4.1	6.1	4.1			4.1
12	17.0	5.7	2.8		2.8			5.7
14	15.6	7.3					2.1	6.2
16	8.0	4.8						3.2
18	1.9	1.9						
Total	183.8	44.6	16.2	20.2	16.5	17.7	2.1	44.6

LIST OF VERMONT NATURAL COMMUNITIES:

UPLAND NATURAL COMMUNITIES

UPLAND FORESTS AND WOODLANDS

Spruce-Fir-Northern Hardwood Forest Formation: Forests of Vermont's Cooler Climate Areas

1. Sub alpine Krummholz
2. Montane Spruce-Fir Forest
 - 2a. Variant: Montane Fir Forest
 - 2b. Variant: Montane Spruce Forest
3. Lowland Spruce-Fir Forest
 - 3a. Variant: Lowland Spruce-Fir Forest, well drained phase
4. Montane Yellow Birch-Red Spruce Forest
 - 4a. Variant: Montane Yellow Birch-Sugar Maple-Red Spruce Forest
5. Red Spruce-Northern Hardwood Forest
6. Boreal Talus Woodland
7. Cold-Air Talus Woodland

Northern Hardwood Forest Formation: Forests of Widespread Distribution in Vermont's Moderate Climate Areas

8. Northern Hardwood Forest
 - 8a. Variant: Beech-Red Maple-Hemlock Northern Hardwood Forest
 - 8b. Variant: Sugar Maple-White Ash-Jack-in-the-pulpit Northern Hardwood Forest
 - 8c. Variant: Yellow Birch-Northern Hardwood Forest
 - 8d. Variant: White Pine-Northern Hardwood Forest
9. Rich Northern Hardwood Forest
 - 9a. Variant: Northern Hardwood Limestone Forest
10. Mesic Red Oak-Northern Hardwood Forest
11. Hemlock Forest
 - 11a. Variant: Hemlock-Red Spruce Forest
12. Hemlock-Northern Hardwood Forest
 - 12a. Variant: Hemlock-White Pine-Northern Hardwood Forest
 - 12b. Variant: Yellow Birch-Hemlock Forest
13. Northern Hardwood Talus Woodland

Oak-Pine-Northern Hardwood Forest Formation: Forests of Vermont's Warmer Climate Areas

14. Red Pine Forest or Woodland
15. Pitch Pine-Oak-Heath Rocky Summit
16. Limestone Bluff Cedar-Pine Forest
17. Red Cedar Woodland
18. Dry Oak Woodland
19. Dry Oak Forest
20. Dry Oak-Hickory-Hophornbeam Forest
 - 20a. Variant: Sugar Maple-Hophornbeam Forest
21. Mesic Maple-Ash-Hickory-Oak Forest
 - 21a. Variant: Transition Hardwoods Limestone Forest
22. Valley Clay plain Forest
 - 22a. Variant: Wet Clay plain Forest
23. White Pine-Red Oak-Black Oak Forest
24. Pine-Oak-Heath Sand plain Forest

- 25. Transition Hardwood Talus Woodland
 - 25a. Variant: Transition Hardwood Limestone Talus Woodland

OPEN UPLAND COMMUNITIES

Upland Shores

- 26. Riverside Outcrop
- 27. Erosional River Bluff
- 28. Lake Shale or Cobble Beach
- 29. Lake Sand Beach
- 30. Sand Dune

Outcrops and Upland Meadows

- 31. Alpine Meadow
- 32. Boreal Outcrop
- 33. Serpentine Outcrop
- 34. Temperate Acidic Outcrop
- 35. Temperate Calcareous Outcrop

Cliffs and Talus

- 36. Boreal Acidic Cliff
- 37. Boreal Calcareous Cliff
- 38. Temperate Acidic Cliff
- 39. Temperate Calcareous Cliff
- 40. Open Talus
 - 40a. Variant: Shale Talus

WETLAND NATURAL COMMUNITIES

FORESTED WETLANDS

Floodplain Forests

- 41. Silver Maple-Ostrich Fern Riverine Floodplain Forest
 - 41a. Variant: Northern Conifer Floodplain Forest
 - 41b. Variant: Successional Floodplain Forest
- 42. Silver Maple-Sensitive Fern Riverine Floodplain Forest
- 43. Sugar Maple-Ostrich Fern Riverine Floodplain Forest
- 44. Lakeside Floodplain Forest

Hardwood Swamps

- 45. Red Maple-Black Ash Swamp
- 46. Red or Silver Maple-Green Ash Swamp
- 47. Calcareous Red Maple-Tamarack Swamp
- 48. Red Maple-Black Gum Swamp
- 49. Red Maple-Northern White Cedar Swamp
- 50. Red Maple-White Pine-Huckleberry Swamp

Softwood Swamps

- 51. Northern White Cedar Swamp
 - 51a. Variant: Northern White Cedar Sloping Seepage Forest
 - 51b. Variant: Boreal Acidic Northern White Cedar Swamp
 - 51c. Variant: Hemlock-Northern White Cedar Swamp
- 52. Spruce-Fir Tamarack Swamp
 - 52a. Variant: Red Spruce-Hardwood Swamp

- 53. Black Spruce Swamp
- 54. Hemlock Swamp
 - 54a. Variant: Hemlock-Hardwood Swamp

Seeps and Vernal Pools

- 55. Seep
- 56. Vernal Pool

OPEN AND SHRUB WETLANDS

Peatlands

- 57. Dwarf Shrub Bog
- 58. Black Spruce Woodland Bog
- 59. Pitch Pine Woodland Bog
- 60. Alpine Peatland
- 61. Poor Fen
- 62. Intermediate Fen
- 63. Rich Fen

Marshes and Sedge Meadows

- 64. Shallow Emergent Marsh
- 65. Sedge Meadow
- 66. Cattail Marsh
- 67. Deep Broadleaf Marsh
- 68. Wild Rice Marsh
- 69. Deep Bulrush Marsh

Wet Shores

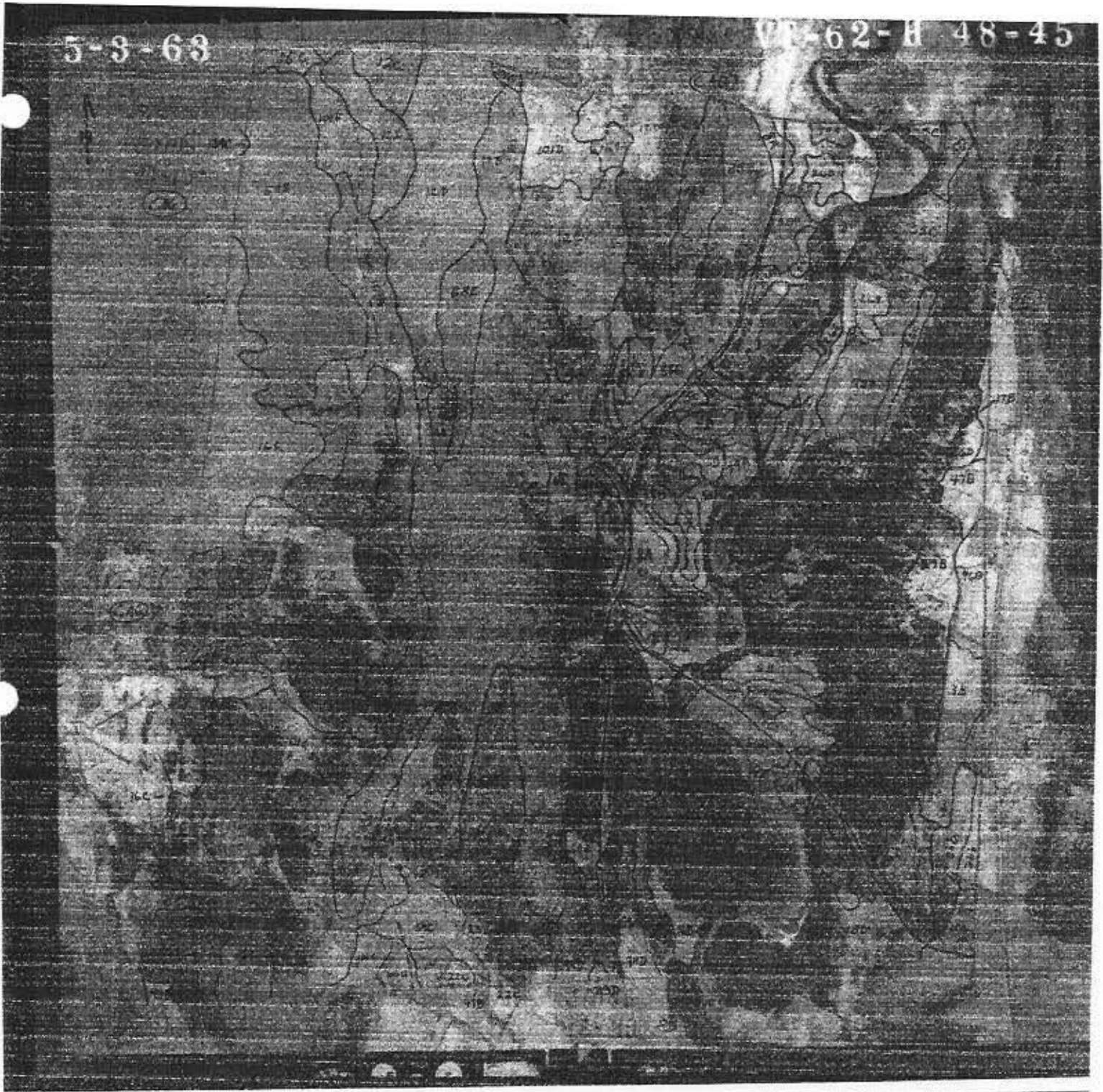
- 70. Outwash Plain Pond shore
- 71. River Mud Shore
- 72. River Sand or Gravel Shore
- 73. River Cobble Shore
- 74. Calcareous Riverside Seep
- 75. Rivershore Grassland
- 76. Lakeshore Grassland

Shrub Swamps

- 77. Alluvial Shrub Swamp
- 78. Alder Swamp
- 79. Sweet Gale Shoreline Swamp
- 80. Buttonbush Swamp
 - 80a. Variant: Buttonbush Basin Swamp

5-3-63

OR-62-H 48-45



Approximate Scale 1" = 1700'
Natural Resources Conservation Service
Orleans County, Vermont
802-334-6276



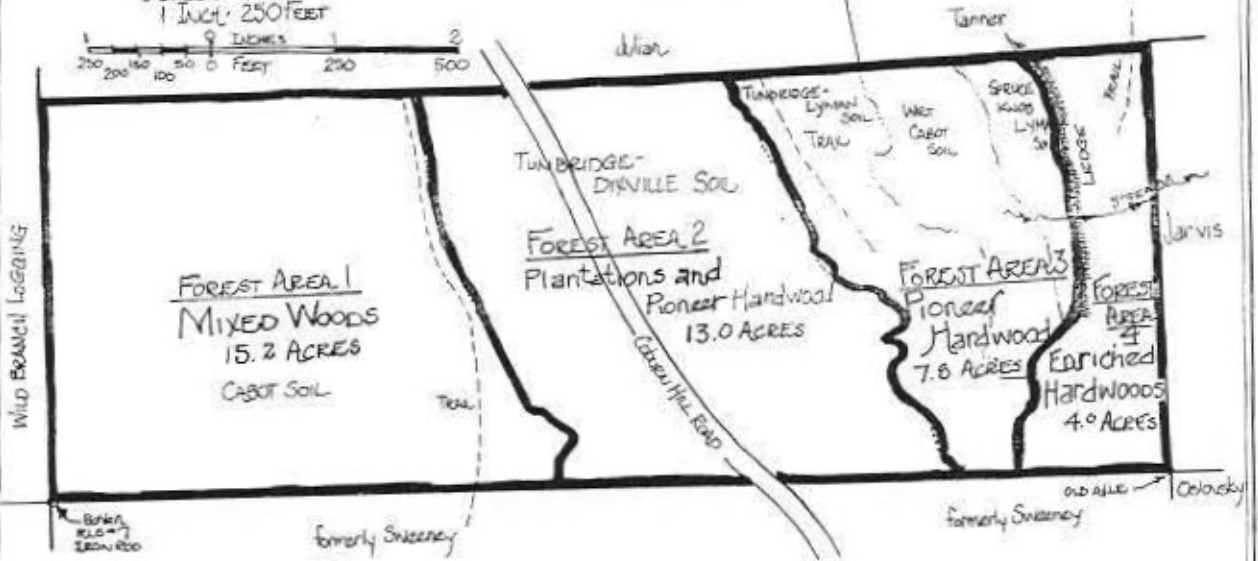
ADVANCE COPY – SUBJECT TO CHANGE

MAP of FOREST LANDS OWNED by
THE TOWN of CRAFTSBURY
 CARTER-COBURN LOT
 COBURN HILL
 TOWN of CRAFTSBURY
 ORLEANS COUNTY
 VERMONT ~ 2005



AREA:
 40 ACRES
 (approximately)

SCALE: 1 to 3000
 1 INCH = 250 FEET



PREPARED FROM ORTHOPHOTO 156240 and CRAFTSBURY TAX MAPS
 PREPARED FOR THE MUNICIPAL FORESTS COMMITTEE, TOWN of CRAFTSBURY
 PREPARED BY ROSS S. MORGAN, FORESTER, CRAFTSBURY, VT.

[Signature] June 17, 2005