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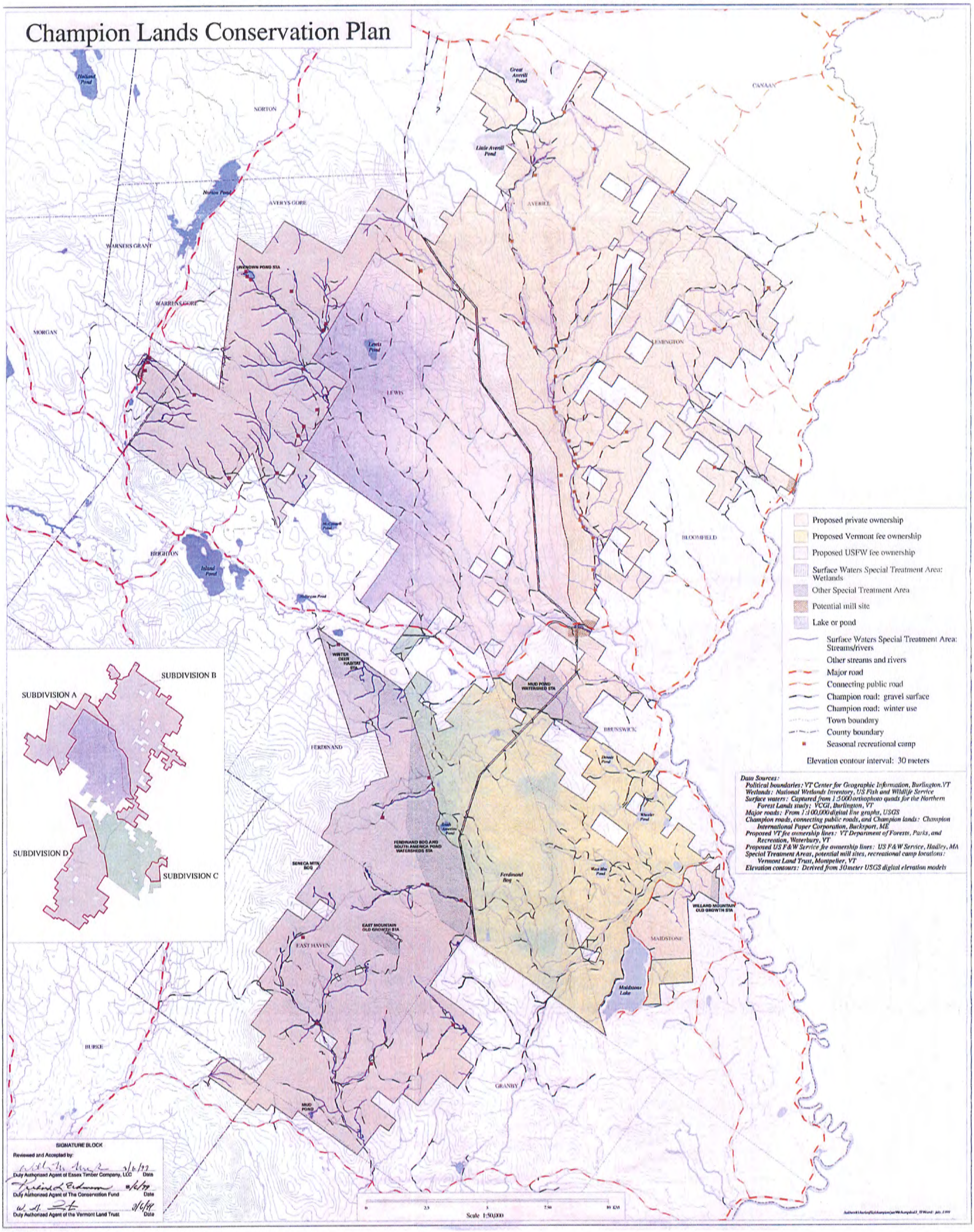
Champion Lands Conservation Plan



6

STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket Nos. 4622/4724

Petition of Vermont Electric Power Company, Inc. for a Certificate of Public Good, pursuant to 30 V.S.A. §248 to construct the Vermont portion of a transmission interconnection between Hydro-Quebec and the New England Power Pool and Petition of New England Power Company for a Certificate of Public Good, pursuant to 30 V.S.A. §248 to construct a converter terminal in Barnet, Vermont, with respect to the proposed transmission line interconnection between the Hydro-Quebec and New England Power Pool Systems	X	Hearings at St. Johnsbury, Vermont February 3, 1982 April 28, 29, 1982 January 5, 1983 Barnet, Vermont October 28, 1982 Burlington, Vermont June 15-18, 21, 29, 30, 1982 July 1, 21, 1982
AND		Canaan, Vermont May 11, 1982
General Order 45 Notice with respect to the following: Phase I Vermont Transmission Line Support Agreement; Amendment No. 1 to Phase I Vermont Transmission Line Support Agreement; Phase I Terminal Facility Support Agreement; Amendment No. 1 to Phase I Terminal Facility Support Agreement; Agreement with Respect to Use of Quebec Interconnection; Amendment to Agreement with Respect to Use of Quebec Interconnection; Preliminary Vermont Support Agreement RE: Quebec Interconnection; Amendment No. 1 to Preliminary Vermont Support Agreement RE: Quebec Interconnection; Amendment to Preliminary Quebec Interconnection Support Agreement; Second Amendment to Preliminary Quebec Interconnection Support Agreement; Vermont Participation Agreement for Quebec Interconnection; Vermont Electric Transmission Company, Inc. Capital Funds Agreement; VETCO Capital Funds Support Agreement; Energy Banking Agreement; Interconnection Agreement; Energy Contract; Agreement Amending the NEPOOL Power Pool Agreement	X	Granby, Vermont July 15, 1982 Island Pond, Vermont February 4, 1982 May 4, 1982 Montpelier, Vermont December 17, 1981 April 7, 1982 June 7, 8, 9, 1982 October 7, 14, 1982 November 30, 1982 Waterford, Vermont November 15, 1982 December 21, 1982 Order Entered: February 25, 1983

PRESENT: V. Louise McCarren, Chairman
Rosalyn L. Hunneman, Board Member
Samuel S. Bloomberg, Board Member

APPEARANCES: Allen Martin, Esq.
John H. Marshall, Esq.
Elaine C. Kilburn, Esq.
for Vermont Electric Power Company, Inc. and New England Power Company

Michael L. Burak, Esq.
Gerald R. Tarrant, Esq.
Peter H. Zamore, Esq.
for Department of Public Service

Harvey Salgo, Esq.
James J. Dunn, Esq.
for Coalition for Wise Power Planning

Jane Marter, Esq.
for Vermont Attorney General

William H. Rice, Esq.
for Vermont Department of Agriculture

Edward R. Zuccaro, Esq.
for Northeastern Vermont Development Association

Edwards O'Boyle, Esq.
for Town of St. Johnsbury and
St. Johnsbury Planning Commission

Michael Flynn, Esq.
for New England Power Company

Robert S. Burke, Esq.
for Town of Waterford

Frederick M. Reed, Esq.
C. Dennis Hill, Esq.
for Town of Barnet

Martin K. Miller, Esq.
for Waterford Springs

INTRODUCTION

This Docket involves four proceedings: (1) the original application filed by Vermont Electric Power Company, Inc. (VELCO) for a Certificate of Public Good to construct a High Voltage Direct Current (HVDC) line from Norton, Vermont to Moore Dam, Waterford, Vermont (Docket No. 4622); (2) review of the contracts filed with the Board pursuant to General Order 45; (3) the amendment of Docket No. 4622 to extend the line from Moore Dam to Barnet, Vermont; and (4) the application of New England Power Company (NEPCO) to construct an AC/DC converter station in Barnet, Vermont (Docket No. 4724).

VELCO's original petition and supporting testimony for the construction of the HVDC line from Norton, Vermont to the Moore Dam was filed on December 1, 1981. At various times subsequent to that filing, VELCO filed, pursuant to General Order 45, notice of its intention to enter into contracts relating to the construction and financing of the line. (See p. 80).
At the April 7, 1982 prehearing conference, the Board consolidated the original petition and these contractual reviews.

The transmission line, as proposed on December 1, 1981, was to connect the Hydro-Quebec system to the New England Power Pool (NEPOOL) system by a Direct Current (DC) link. Hydro-Quebec is the provincially owned, virtually sole provider of electricity in the province of Quebec. By 1981, Hydro-Quebec had 18,500 MW of installed capacity, 95% of which is hydroelectric generation. NEPOOL is the coordinated power pool for virtually every electric

distribution company in the six New England states. NEPOOL centrally dispatches almost every generating unit in New England, provides back-up generation and facilitates sales and purchases among New England's utilities. The original petition called for the line, originating in Norton, Vermont, to terminate at the Comerford Dam in Waterford, Vermont.

The portion from Norton to Moore is approximately 55 miles long, and would be located in the Towns of Norton, Avery's Gore, Averill, Lewis, Bloomfield, Brunswick, Ferdinand, Granby, Victory, Lunenburg, Concord and Waterford. The line is then to cross the Connecticut River at Littleton, New Hampshire, and continue along an existing corridor for 6.3 miles to Comerford Dam on the Connecticut River at Barnet, Vermont and Monroe, New Hampshire to allow interconnection with the existing AC transmission network of New England.[1]

In addition to the direct case prefiled on December 1, 1981, VELCO also filed, on June 1, 1982, the prefiled testimony and exhibits of Rolande-H. Lalande of Hydro-Quebec and John D. Fassett on behalf of NEPOOL in accordance with the Board's direction that the Company present witnesses from Hydro-Quebec and NEPOOL on the ability of Hydro-Quebec to deliver energy and on the integration of the line with the NEPOOL system. On June 17, 1982, VELCO filed the prefiled testimony and exhibits of Franklin D. Sanders from the First Boston Corporation, in accordance with the Board's direction that the Company present additional evidence on the financing of the proposed project.

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1. The transmission facilities set forth in this paragraph constitute "Phase I" of what VELCO/NEPOOL envisions as a two-step project, and is the only proposal subject to this proceeding. "Phase II" contemplates the extension of the line from Monroe, N.H. to Sandy Pond Substation in Massachusetts.

Pre-hearing conferences on the original VELCO filing were held in Montpelier on December 17, 1981 and April 7, 1982. On December 17, 1981, the Board granted party status to the following: the Department of Public Service (DPS); the Vermont Attorney General (AG); the Vermont Department of Agriculture; the Northeastern Vermont Development Association (NVDA); and the Coalition for Wise Power Planning (Coalition). The DPS, through its General Counsel, Gerald R. Tarrant, indicated it would coordinate the testimony of witnesses from various state agencies such as the Agency of Environmental Conservation (AEC) and the Department of Health. Notice was given and hearings were held as listed above.

The Board held six public hearings throughout Vermont -- on February 3, 1982 in St. Johnsbury, on February 4, 1982 in Island Pond, on May 11, 1982 in Canaan, on July 15, 1982 in Granby, on October 28, 1982 in Barnet and on November 15, 1982 in Waterford. The purpose of these hearings was to obtain the views of non-party members of the public and to understand the concerns of the public, particularly those living in the communities through which the transmission line was proposed to go.

On September 20, 1982, after the close of the evidence, but before a decision had been rendered, VELCO petitioned the Board to amend its original request to extend the line from Comerford Dam to Barnet, via Waterford, Vermont (referred to sometimes as "the amendment"). The amendment calls for the line to be continued from Comerford Dam through Waterford for 6.7 miles, terminating at Barnet on the Connecticut River. NEPCO's petition called for the DC/AC converter to be located in Barnet, Vermont.

From Barnet, Vermont the energy would cross the Connecticut River to New Hampshire and be transmitted via existing AC transmission lines through New Hampshire.

VELCO prefiled its testimony in support of the amendment on September 20, 1982. A prehearing conference was held on October 7, 1982 at which time the Town of Waterford, the Waterford Planning Commission, the Town of St. Johnsbury and the St. Johnsbury Planning Commission were granted party status.

On September 27, 1982, New England Power Company filed a petition and supporting prefiled testimony for a certificate of public good to construct a DC/AC converter station at Barnet, Vermont ("the converter"), Docket No. 4724. A prehearing conference on this petition was held on October 14, 1982, at which time the Board of Selectmen and the Planning Commission of the Town of Barnet were granted party status. This Docket was consolidated for hearing with Docket No. 4622. (Tr. 10/14/82 at 46.)

On December 7, 1982, NEPCO and VELCO filed a motion to withdraw, respectively, their application and amendment. The motions to withdraw were filed because of a favorable decision in New Hampshire with respect to the location of the remaining portion of the line and converter station. A hearing was held on December 21, 1982, at which time the motion to withdraw was denied, and hearings on the merits were set for January 5, 6 and 7, 1983. The Town of Barnet (Barnet) and the DPS filed testimony, and Barnet subpoenaed several of VELCO's and NEPCO's witnesses.

Before the commencement of hearings, Barnet reached a settlement with NEPCO and, at the hearing, withdrew its prefiled testimony and presented no evidence. NEPCO and VELCO renewed their motions to withdraw, which were again denied. The DPS then placed into the record its prefiled testimony with respect to the amendment and the converter.

We will first make findings and conclusions with respect to the amendment and NEPCO's petition and then discuss the original petition and the contracts.

THE VELCO AMENDMENT AND THE NEPCO PETITION

1. As a site for the converter, Monroe, New Hampshire is preferable to Waterford, Vermont or Barnet, Vermont because the connecting route is shorter, resulting in lower costs, line loss, and maintenance expense. Stensrud supp. pf. at 3.

2. Barnet, Vermont and Monroe, New Hampshire are both close to NEPCO's operational headquarters, making the sites equally appropriate for the converter for operational purposes. Id.

3. It would cost less to site the converter at Monroe, New Hampshire than at any of the other proposed sites. Id. at 3,5.

4. As compared with Barnet, Vermont, Monroe, New Hampshire is a more desirable site for the converter from an esthetic and planning point of view because it allows the line to run through a shorter, existing corridor, rather than creating a new corridor. Boyle supp. pf. at 3; Tr. 12/20/82.

201. To the degree reasonably practicable, the corridor herein approved avoids settled areas and locations wherein substantial population growth may be expected to occur. The corridor is compatible with present land use. Klunder pf. at 10,12; Boyle pf. at 10; PSD Exh. 6.

We conclude that the corridor as proposed by VELCO -- with the exceptions of the portions in Granby and Victory, where we find the DPS Harris Mountain alternative to be preferable, and in the Moore Reservoir area, where we find the existing VELCO right-of-way to be the better location -- is an appropriate route and that it is consistent with the criteria of Section 248. Our conclusion is based on the testimony presented by the parties, the opinions of the municipalities through which the corridor passes and our own views of the geography. With respect to the latter, we viewed the entire route by air, and we also walked portions of the disputed sections in Granby and Victory and in the Moore Reservoir area, viewing the latter from both New Hampshire and various points in Vermont.

GENERAL ORDER NO. 45 REQUIREMENTS

General Order No. 45 requires electric utilities to give advance written notice to the Board before executing any contract for the construction, purchase, sale or lease of any transmission or generation facilities within or outside the State of Vermont. Absent a waiver by this Board, such notice must be filed at least

To date, seventeen separate agreements have become a part of this case either as exhibits, through information requests or as conventional General Order No. 45 notices. Although not all of the contracts have been offered as G.O. 45 petitions, we treat them as such insofar as is necessary for approval under the provisions of the General Order. The contracts are listed below.[1]

---

[1] The General Order 45 contracts filed with the Board, which are a part of this proceeding are:

1. Phase I Vermont Transmission Line Support Agreement (VELCO Exh. 45);
2. Amendment No. 1 to Phase I Vermont Transmission Line Support Agreement (filed 2/17/82);
3. Phase I Terminal Facility Support Agreement (VELCO Exh. 43);
4. Amendment No. 1 to Phase I Terminal Facility Support Agreement (VELCO Exh. 44);
5. Agreement with Respect to Use of Quebec Interconnection (VELCO Exh. 41);
6. Amendment to Agreement with Respect to Use of Quebec Interconnection (VELCO Exh. 42);
7. Preliminary Vermont Support Agreement RE Quebec Interconnection (VELCO Exh. 47);
8. Amendment No. 1 to Preliminary Vermont Support Agreement RE: Quebec Interconnection (filed 2/17/83);
9. Amendment to Preliminary Quebec Interconnection Support Agreement (filed 2/17/83);
10. Second Amendment to Preliminary Quebec Interconnection Support Agreement (filed 2/17/83);
11. Vermont Participation Agreement for Quebec Interconnection (VELCO Exh. 51);
12. Vermont Electric Transmission Company, Inc. Capital Funds Agreement (filed 9/15/82);
13. VETCO Capital Funds Support Agreement (filed 2/17/83);
14. Energy Banking Agreement (VELCO Exh. 49);
15. Interconnection Agreement (VELCO Exh. 48);
16. Energy Contract (VELCO Exh. 52);
17. Agreement Amending the NEPOOL Power Pool Agreement (VELCO Exh. 50).

The significant terms and conditions of these contracts have been reviewed in detail by the Board. We find that they are reasonable and that they meet the criteria we set forth in In Re: General Order 45 Notice Filed by Washington Electric Cooperative, Inc., Order dated 1/8/82. The period of advance notice is hereby waived for all applicable contracts, for VELCO, VETCO, and all participating Vermont distribution companies.

CONCLUSION

As is the case with any other major capital undertaking by a utility, the HVDC project involves not only substantial potential benefits but also large costs and manifold risks. The costs are not only the obvious ones represented by the figures in the accountants' books, but also the loss of the opportunity for other investments and the degradation of the natural environment. All of these costs, as well as the advantages, will ultimately accrue to the ratepayers of Vermont.

30 V.S.A. §248 embodies a very straightforward and practical view of utility planning. It does not require us to disapprove proposals merely because they are costly, risky or in certain respects damaging to the environment. The question is whether the negative features of a project are too excessive in relation to the benefits which may reasonably be expected. Thus, our task is to determine whether the costs of the project, discounted by the degree of risk, outweigh the benefits.

The problem may be stated in the form of a mathematical equation, but its solution is almost entirely a matter of judgment and discretion. It is not merely a matter of plugging hard data into a rigid formula. For, as we observed in our decision in Docket No. 4450, in which we granted a certificate of public good for the McNeil generating station,

> Available facts are often incomplete. Most are subject to rapid change, and reasonable people can differ as to the significance of even those facts that are clear and likely to remain unchanged. Further, the most important considerations often are not facts in any real sense -- they are only predictions or forecasts. Such forecasts ultimately depend upon variables which are themselves impossible to predict with precision including, among others, changes in demographics, economic conditions, the price of electricity, the elasticity of demand at various prices, the availability and price of substitutes and the degree and effects of conservation programs. Opinion at p. 22.

As we have already indicated, the economic issues are one of the keys to this project. Whether it will be financially advantageous will depend on many factors, including construction costs, financing costs, the in-service date, the price of oil and a number of developments in Canada. The Petitioner will have substantial control over some of these factors, little or none over others. With respect to those matters which are not beyond the Petitioner's ability to control, in particular the costs of construction and financing and the construction schedule, we believe we should be kept continuously informed. We do not condition the certificate upon costs and completion being in accordance with the Petitioner's evidence, but we are requiring that any substantial changes, either known or reasonably expected, be reported to us promptly. We retain the authority to require

an appropriate change of course if circumstances themselves change so drastically that the underlying premises of the project become completely untenable.

The fact that we have decided to issue a certificate does not mean that a contrary decision would be inconceivable. Others may, for example, judge as unacceptable the risk that Canada will require more power than now seems probable, that the costs of other sources of supply will not increase or will even diminish, or that air ions or other effects of DC transmission may yet be found to be substantially harmful. We take none of these risks lightly, yet we recognize that similar risks attend to any other course of action. If the line is not built, and if the need for other power does materialize but cannot be satisfied, the economic costs (which, of course, will translate in part into environmental and health costs as well) could be enormous. Or if the loss of the line eventually necessitates the building of, say, a coal-fired generating facility, it is inevitable that serious environmental, health and safety issues will be present as a result of that choice.

Having in mind this perspective we find that all the statutory criteria are met and that the construction of the HVDC line will promote the general good of the state.

ORDER

IT IS HEREBY ORDERED, ADJUDGED AND DECREED by the Public Service Board of the State of Vermont that:

1. Construction by Vermont Electric Power Company, Inc. and Vermont Electric Transmission Company, Inc. of the Vermont portion of a 450± KV direct current transmission interconnection between the transmission systems of Hydro-Quebec and NEPOOL will, subject to the conditions set out in the certificate, promote the general good of the State.

Dated at Montpelier, Vermont this 25th day February, 1983.

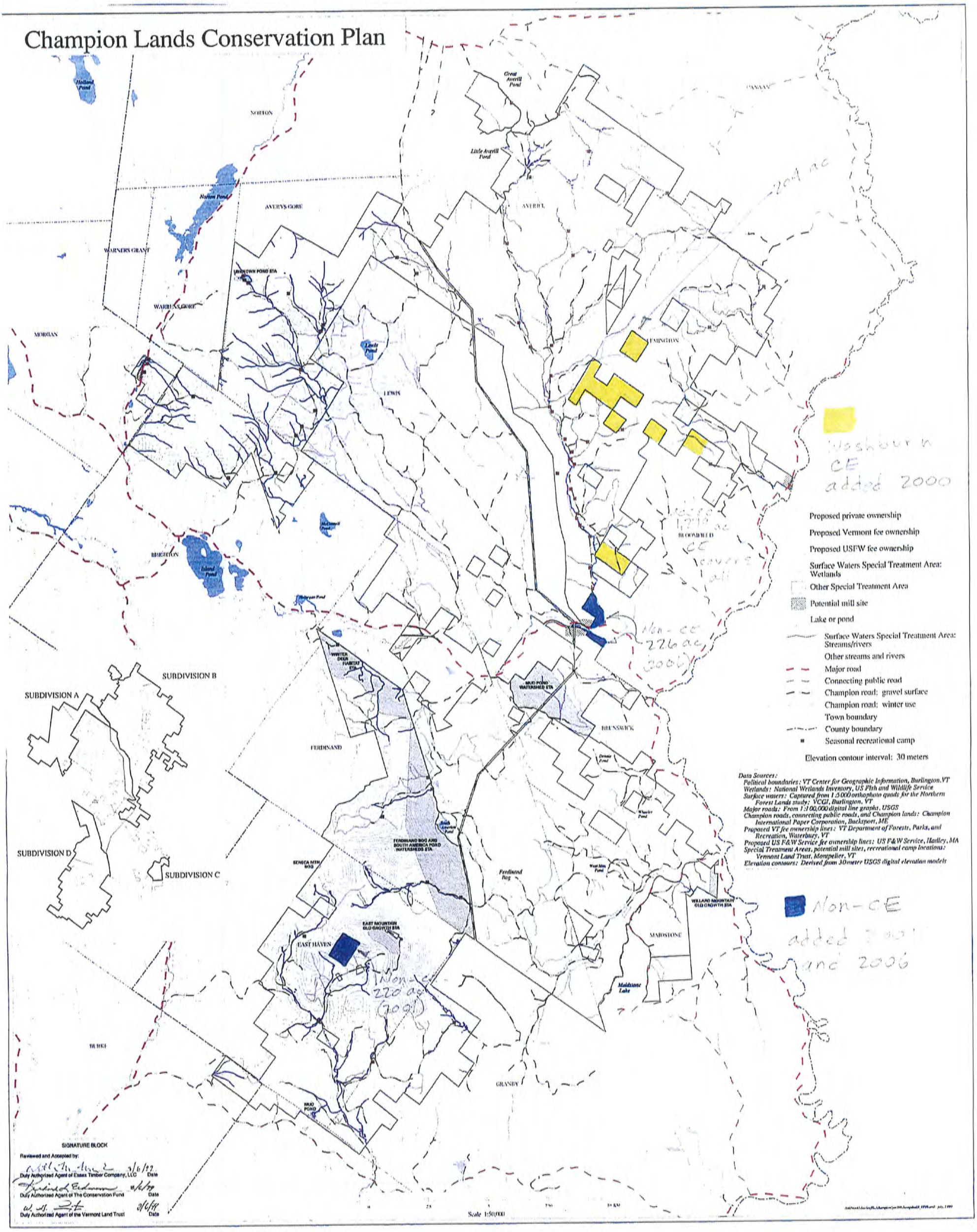
s/ V. Louise McCarren)
) PUBLIC SERVICE
)
s/ Rosalyn L. Hunneman) BOARD
)
) OF VERMONT
s/ Samuel S. Bloomberg)

OFFICE OF THE CLERK

FILED: February 25, 1983

ATTEST: s/ Susan M. Hudson
Clerk of the Board

Champion Lands Conservation Plan



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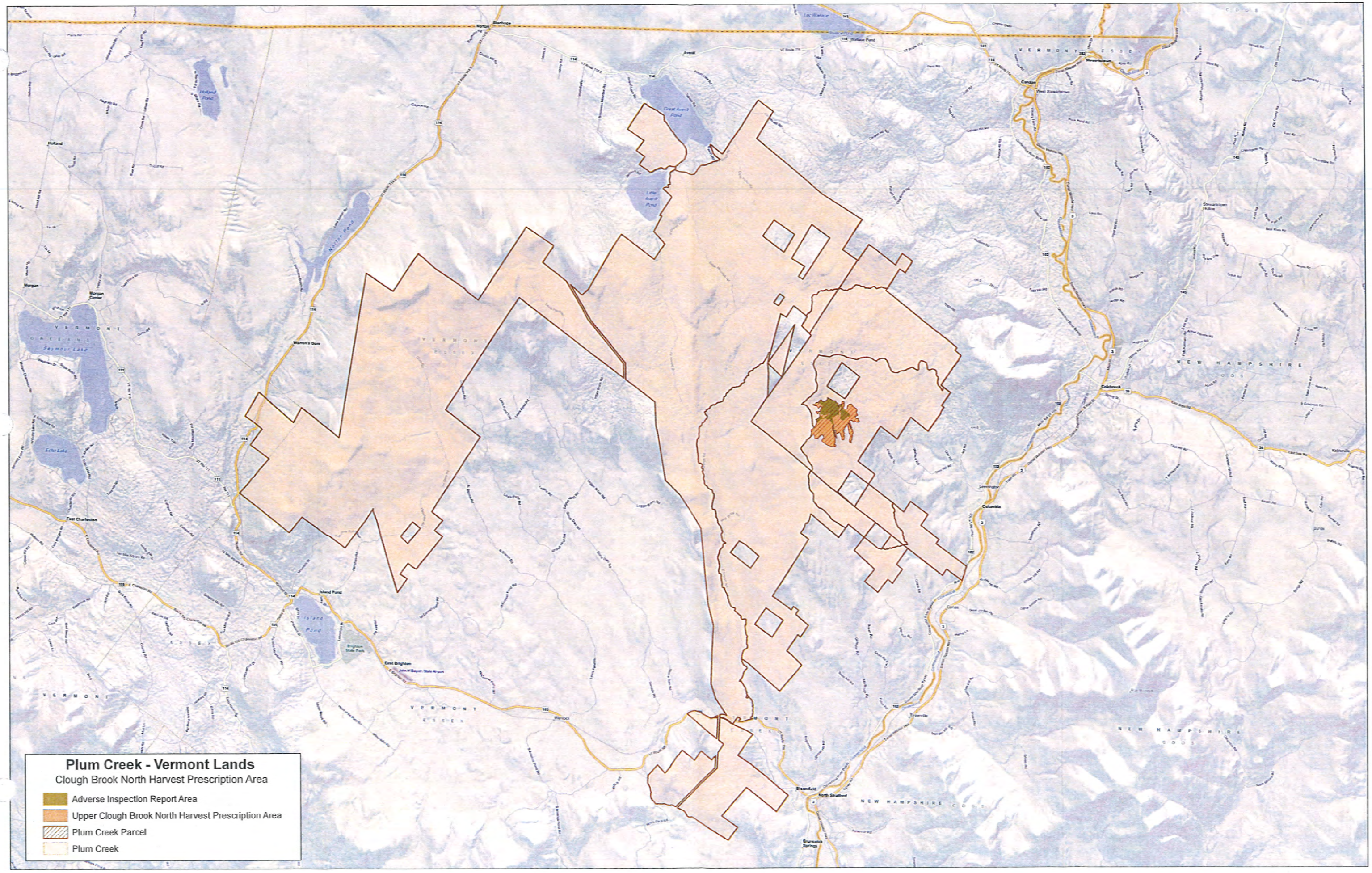
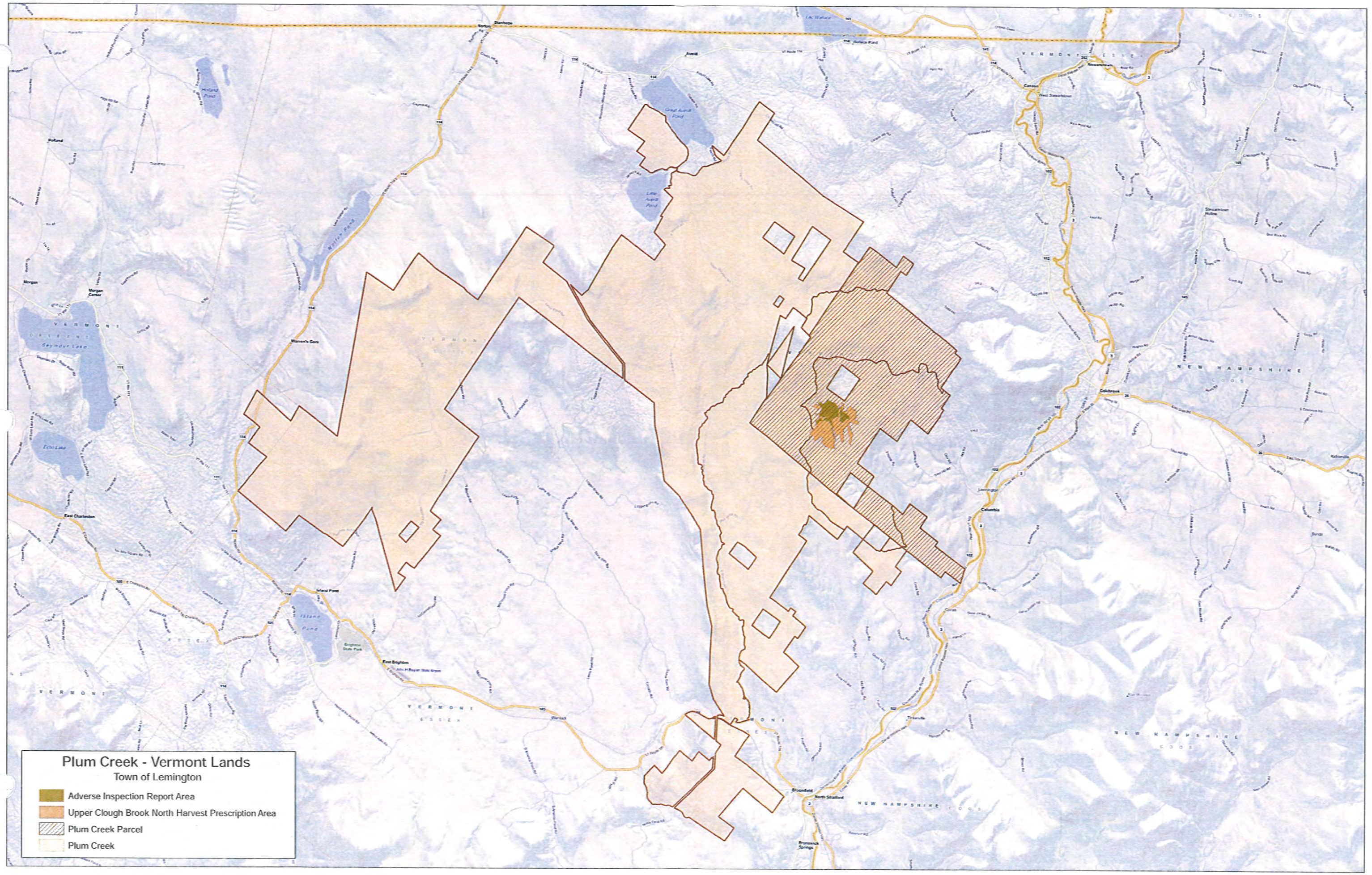

Plum Creek - Vermont Lands
Clough Brook North Harvest Prescription Area
Adverse Inspection Report Area
Upper Clough Brook North Harvest Prescription Area
Plum Creek Parcel
Plum Creek
Norton
Stanhope
Holland
Morgan
Morgan Center
Warren's Gore
East Charleston
Island Pond
East Brighton
Wenlock
Averill
Wallace Pond
Great Averill Pond
Little Averill Pond
Norton Pond
Holland Pond
Seymour Lake
Echo Lake
Island Pond
Brighton State Park
Canaan
West Stewartstown
Stewartstown Hollow
Colebrook
Columbia
Lemington
Tinkerville
Bloomfield
North Stratford
Brunswick Springs
VERMONT
ESSEX
NEW HAMPSHIRE
COOS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Town of Lemington
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Stanhope
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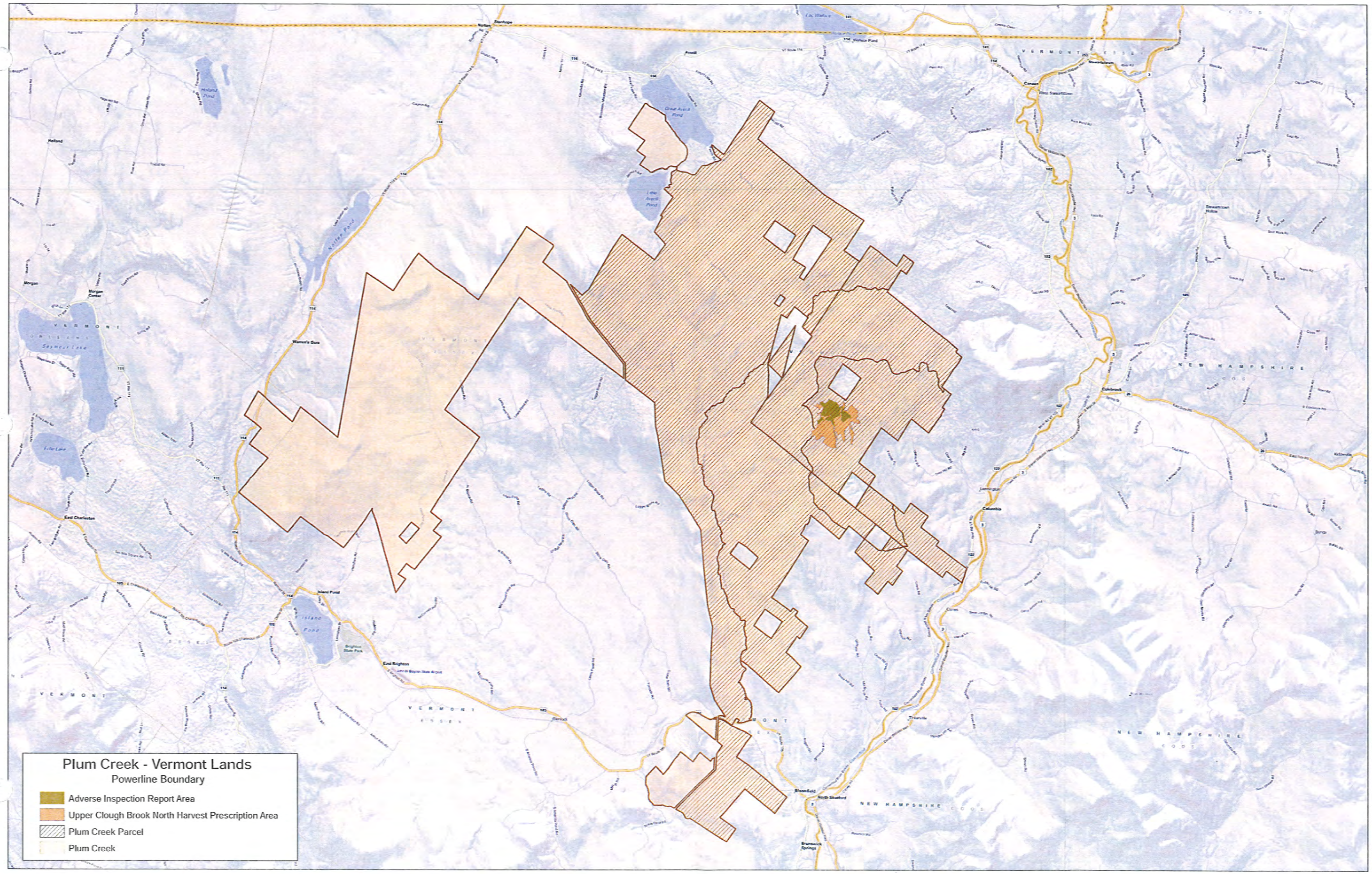
Wallace Pond
Great Averill Pond
Little Averill Pond
Holland
Holland Pond
Morgan
Morgan Center
Seymour Lake
Echo Lake
Warren's Gore
Mirror Pond
Canaan
West Stewartstown
Stewartstown Hollow
Colebrook
Columbia
Lemington
Trinidad
East Charleston
Island Pond
Brighton State Park
East Brighton
John H Boyan State Airport
Warlock
Bloomfield
North Stratford
Brunswick Springs
VERMONT
ESSEX
ORLEANS
NEW HAMPSHIRE
COOS

Plum Creek - Vermont Lands

56,604 Acres

- Adverse Inspection Report Area
- Upper Clough Brook North Harvest Prescription Area
- Plum Creek Parcel
- Plum Creek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Plum Creek
VERMONT
ESSEX
ORLEANS
NEW HAMPSHIRE
COOS
Norton
Averill
Wallace Pond
Great Averill Pond
Lake Averill
Holland Pond
Holland
Morgan
Morgan Center
Seymour Lake
Echo Lake
East Charleston
Warren's Gore
Island Pond
Brighton State Park
East Brighton
John H Boyce State Airport
Norton Pond
Canaan
Vt. Transcanada
Stewartstown
Stewartstown Hollow
Colebrook
Columbia
Errol
Bloomfield
North Stratford
Brunswick Springs
Pittsburg
Kidderville

Plum Creek

Clough Brook North Harvest Area
Lemington, VT
Stand #43 Basal Area Per Plot
August/September 2011

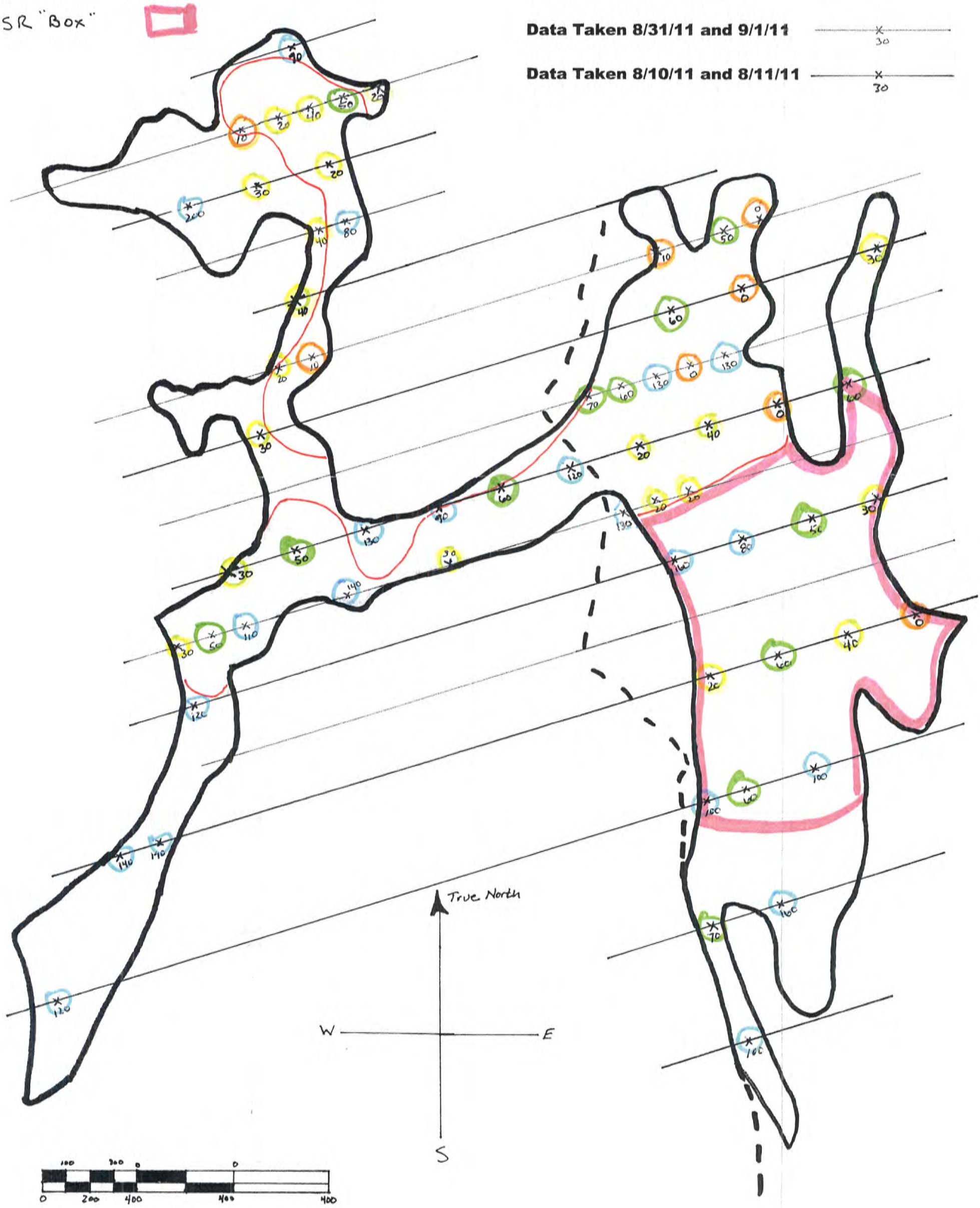
TREATMENT LOCATIONS:

0-10 OSR OR GAPS
20-40 LOW D 2SS
50-70 HIGH D 2SS
80+ LEAVE OR RIPARIAN
OSR "Box"

Alleged Cut Contrary Area

Data Taken 8/31/11 and 9/1/11

Data Taken 8/10/11 and 8/11/11



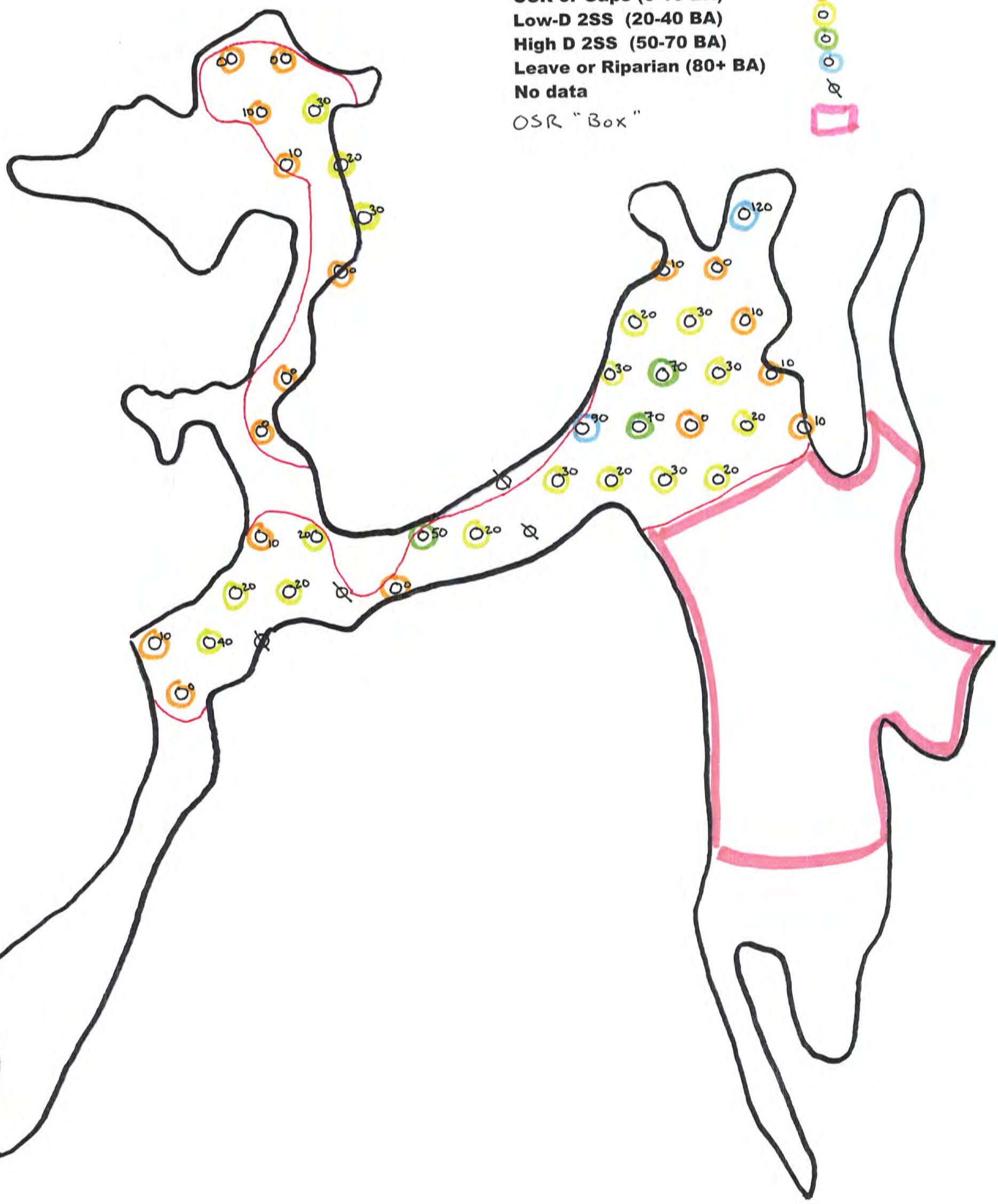
Plum Creek

Clough Brook North Harvest Area
Lemington VT

Stand 43 Basal Area Per Plot
Matt Langlais data 3/17/10 and 4/13/10

Legend:
Stand Boundary
Alleged cut contrary area

Treatment locations:
OSR or Gaps (0-10 BA)
Low-D 2SS (20-40 BA)
High D 2SS (50-70 BA)
Leave or Riparian (80+ BA)
No data
OSR "Box"



FOREST MANAGEMENT PLAN

ESSEX TIMBER COMPANY, LLC
ESSEX, ORLEANS, & CALEDONIA COUNTIES, VERMONT
VT FP & R DEPT, VLT & FSC VERSION

November, 2007

LandVest, Inc.
Timberland Division
5086 U.S. Route 5
Newport, Vermont 05855
802-334-8402
Richard G. Carbonetti ACF CF
VP Timberland
Project Manager

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Use Value Appraisal Forest Management Plan Signature Page:

For the Lands of Essex Timber Company November 2007

Owner's Approval and Acceptance of the Forest Management Plan:

Wil Merck for Essex Timber — Date: 12/3/07

Caledonia/Essex County Forester's Approval and Acceptance of the Forest Management Plan:

Matt Langlais for the VT Department of Forests, Parks and Recreation — Date: 12·19·07

Vermont Land Trust's Approval and Acceptance of the Forest Management Plan:

Dan Kilborn or Pieter van Loon for the Vermont Land Trust — Date: 12/27/07

Alternative UVA Plans for Selected Large Landowners

Background:

Some forestland in Vermont has historically been owned and managed by large industrial landowners. Although relatively recently sold by such companies as Champion International and International Paper, some of these lands have remained as fairly intact large contiguous holdings through conservation efforts, often managed by Timber investment and management organizations (TIMO's).

Historically, many of these lands have not been enrolled in Vermont's Use Value Appraisal Program. With the passage of ACT 60, this has now changed with all of the State's largest landowners now enrolled. Statewide the average parcel size for enrolled forestland is 110 acres although in Essex County, where ownerships are largest, it is 650 acres. This figure reflects the fact that four landowners own roughly 70% of the total 200,000 acres of UVA-enrolled forest land (with over half of this being enrolled in the last five years). The Use Value Program is now a necessary component for these lands to be economically viable for owners. Given the UVA program's statewide application, ownerships of tens of thousands of acres are held to the same standards as those applied to 25 acre parcels. Managers of these lands have shown that they cannot feasibly meet some of the minimum requirements of the program.

The main issue preventing the managers of these lands from meeting the program standards is the stratified random sampling inventory system commonly used to develop plans for large ownerships. This system is at odds with standards of UVA because UVA requires stand specific information and this stratified inventory system provides only coarse information on forest types across any land block. To enable large ownerships to participate in UVA with meaningful plans, an alternative to the plan inventory guidelines is needed.

Alternative Plans
The proposed alternative would require that the landowner submit a "10-year concept" plan for contiguous blocks of forestland 5,000 acres and larger. The Department of Forest, Parks & Recreation would approve these concept plans which would include the following components:

1. Map to standards with stands delineated and stand numbers assigned (as with all UVA plans)
2. For each broad forest cover type described from the stratified random sample:
    a. Corresponding UVA type
    b. Acreage
    c. Forest Cover Type description
    d. Management recommendations including area regulation scheme. Silvicultural prescriptions to be employed and a description of stand conditions for which each prescription will be utilized

All individual stands are considered to have "no activity" under this conceptual plan. When an entry or harvest or other activities is planned, the consultant will submit an amendment for approval. Approval must be received prior to commencement of harvest activities.

The amendment document will include stand specific information from a pre-sale cruise and meet all of the *minimum standards for forest management* as described in the UVA Program Manual effective April 15, 2006. This includes copies of maps with stands clearly delineated.

Activity plan amendments will be accepted for review twice a year:

For fall/winter harvests by August 1

For summer harvests by April 1

Managers should plan harvests for a year on any given block in which an amendment is submitted.

Discontinuous blocks of land less than 5,000 acres in size will not be eligible for this alternative UVA plan, whether or not the owner/manager has other blocks that are.

Harvesting and other activities that take place without the signed amendment from the County Forester will be considered in nonconformance with the filed UVA plan.

The schedule and requirements for the plan Conformance Inspection Reports (CIR's) any plan updates, other amendments or reporting changes are not affected by this procedure.
Entry plans will cite both total and acceptable growing stock (AGS) residual Basal Areas as well as quadratic mean stand diameter (MSD) along with the appropriate Silvicultural Guides.

Owner's Approval and Acceptance of the UVA Large Tract Forest Management Plan Standards:

Wil M. Merck Date: 12/3/07

Wil Merck for Essex Timber

Caledonia/Essex County Forester's Approval and Acceptance of the UVA Large Tract Forest Management Plan Standards:

Matthew L. Langlais Date: 12-19-07

Matt Langlais for the VT Department of Forests, Parks and Recreation

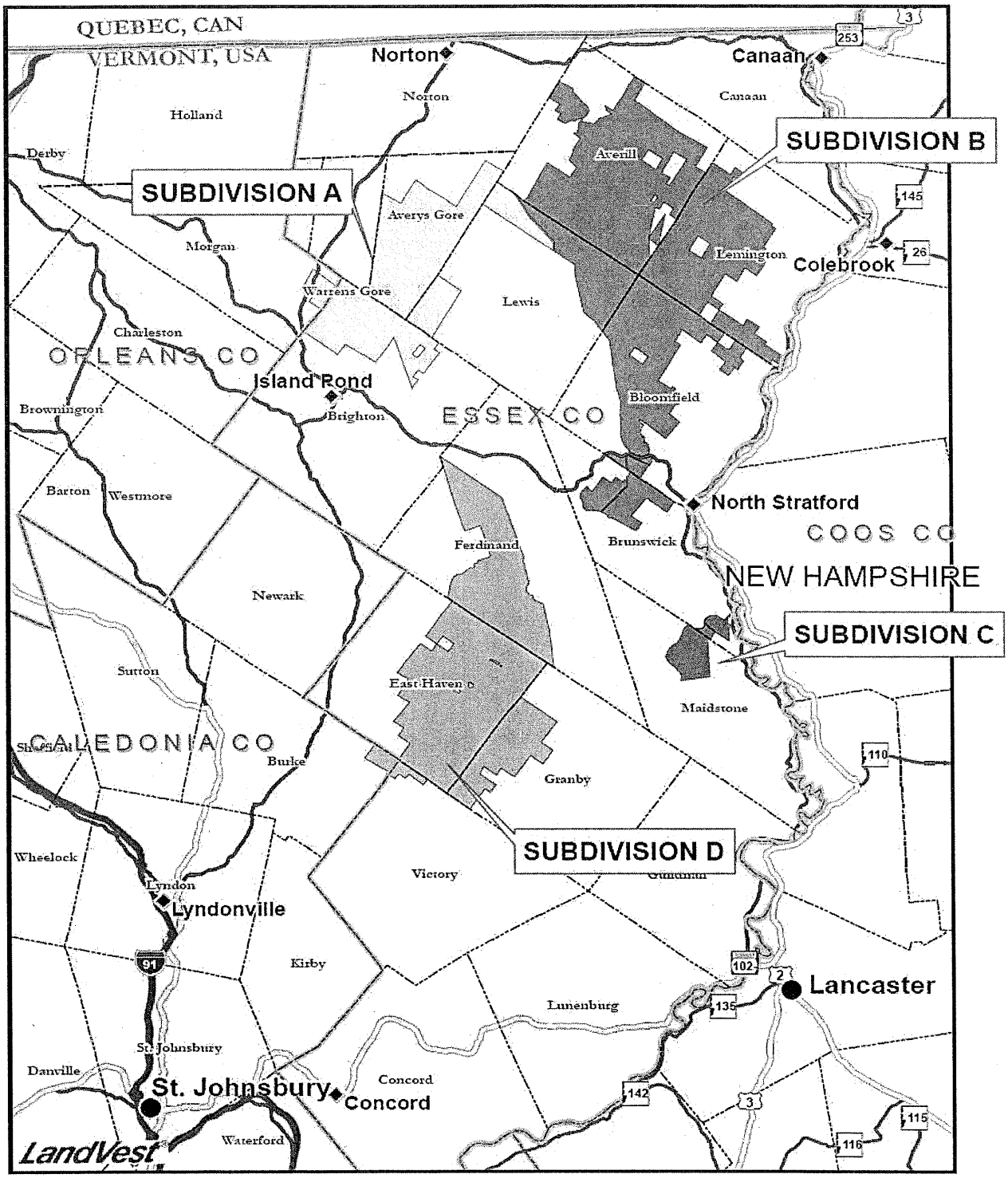
PART I - Essex Timber Company

INTRODUCTION

In 1998, Champion International Corp. (Champion) sold its Vermont timberlands to The Conservation Fund (TCF). TCF in turn sold 26,000 acres to US Fish & Wildlife Service (USF&WS) and 22,000 acres to the state of Vermont. The balance, about 84,000 acres, was placed on the market by TCF. Essex Timber Company, LLC (ETC) was the successful bidder in the competition to purchase this tract. Upon conveyance, the land was encumbered by a conservation easement and a public access easement.

ETC purchased the land as an investment. Its investment objectives coordinate well with sustainable management of the forest resource and a wide range of conservation and resource values.

ETC has owned the former Champion Lands for seven years. As a continuing commitment to sustainable management, ETC is following its initial Forest Management Plan and has contracted with LandVest Timberland to do an inventory and develop an updated Forest Management Plan that complies with Forest Stewardship Council (FSC) certification, the state's Use Value Assessment program (UVA), and the terms of the conservation easement on its ownership. This plan will cover the next ten years 2007 through 2017.


QUEBEC, CAN
VERMONT, USA
Norton
Canaan
Holland
Norton
Canaan
Derby
SUBDIVISION A
SUBDIVISION B
Averill
Avery's Gore
Morgan
Lemington
Colebrook
Warrens Gore
Lewis
Charleston
ORLEANS CO
Island Pond
Brighton
ESSEX CO
Bloomfield
Brownington
Barton
Westmore
North Stratford
Brunswick
COOS CO
Ferdinand
NEW HAMPSHIRE
Newark
SUBDIVISION C
Sutton
East Haven
Maidstone
CALEDONIA CO
Sheffield
Burke
Granby
SUBDIVISION D
Wheelock
Victory
Lyndon
Lyndonville
Kirby
Lancaster
Lunenburg
St. Johnsbury
Danville
St. Johnsbury
Concord
Concord
Waterford
LandVest
253
3
145
26
110
102
2
135
142
3
115
116
91

LAND USE HISTORY

"The fertility and extent of the upper Connecticut River valley flood plain enabled an even larger-scaled industry to eventually dominate the landscape- logging and lumbering. While agriculture in this area went through a succession similar to other agricultural regions in the Northeast; wheat/livestock, sheep, and then dairy, intermixed with varying degrees of diversity determined by local conditions and external market demand, agriculture was to be sustained throughout the last half of the nineteenth and first half of the twentieth centuries by the logging and lumber industry.

As the scale of efficiency increased the productive capacity of lumber and wood manufacturing mills, marginally productive farms, away from the rich intervales, were further absorbed into the rapidly expanding forest industry. Intensification of agriculture, improvement of market access, and mechanical innovation increased the size and productive capacity of fewer and fewer farms, and also created situations where plant, animal, water, and mineral resources were incorporated into more complex production regimes serving multiple industries.

This era, roughly spanning the years 18401880 was dominated by logging and lumbering, but was a time in which local farmer's participated, rural communities were settled, and manufactured goods were exported." [1] "The introduction of the railroad was instrumental in the progress of the lumber and wood manufacturing mills throughout the entire 'Spruce-Fir-Northern Hardwood' vegetation zone. In a larger sense, railroads were an adaptation to wood scarcity. As with the logging railroad, technology enabled industrialists to gain access via rail to sources of the materials out of which most of the nineteenth century cultural landscape was built- wood, stone and agricultural products." [2] The wood scarcity was due to industrial sector growth and expansion, the war effort and the post-war baby boom. This scarcity was becoming most evident in the softwood component of the northeastern forest. Another contributing factor to greater removals of the softwood component was due to a lack of technology in the conversion of low-grade hardwood into paper. It was not until the 1970's that large-scale harvesting of the hardwood component begun. St. Regis Paper Company stumpage reports clearly show this trend. A stumpage report from 1939 to 1956 shows 419,000 softwood cords and 15mmbf of softwood harvested, while only 4,000 hardwood pulp cords were harvested from their Vermont lands. It is important to point out that market-driven harvests of hardwood sawtimber were also taking place. In the same period, 97mmbf of birch and maple were harvested. Up to the late 1960's low-grade hardwood removals were low with little volatility. A stumpage report from 1970-71 shows a distinct shift to capture the low-grade hardwood standing timber. The report shows 17,000 cords of hardwood pulp harvested. This trend continued through St. Regis' tenure and was continued by Champion Corporation's ownership.

During the ownership period of St. Regis Paper Company and through Champion's ownership the lease camp practice was established and expanded. The camp culture exists today and provides ETC with revenue and constant "eyes-on-the-land". Leaseholders have provided past and present owners with information regarding road conditions and report unlawful uses on the land. The expansion and maintenance of company roads has established a pattern of year round use creating added administrative time for ETC. ETC has seen no conflict between camp leasing and timber management and plans to continue the camp tradition.

The former Champion lands played and will continue to play a significant role in the local and regional economy. The lands now have an increasing burden of providing an array of objectives.

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[1] People, Land and History: The Cultural Landscape of the Nulhegan District. 01-15-01. Scharoun, et.al.)
[2] ibid

Recreational uses have increased and are expected to continue to increase. While certain types of public access are guaranteed by the Public Access Easement, the management of that access is almost entirely the obligation of the state's Agency of Natural Resources. ETC lease camps comprise only a small percentage of the total recreational users. According to Gray Stevens of the Vermont Outdoor Guides Association, at least 20 commercial guiding companies use the ETC and surrounding lands. He further predicts that "...considerable economic benefits to the region..." will be realized over time.[3] The Vermont Department of Forests, Parks and Recreation has been carrying out a day-use study to determine the levels of use as well as the areas of high ingress and egress. When these levels are reported, ETC and the easement holders will be better positioned to make decisions on the variety of recreational uses. Currently no overnight camping is allowed outside the leased camps.

While recreation is significant, timber management has been the most important economic benefit from this land to the local communities, and we expect that to remain so for the period of this plan. For reasons of both local economic benefit and quality control, ETC is committed to hiring, training and establishing relationships with local contractors. While ETC needs to capture the highest value for its raw material, efforts are made to direct the flow of raw material to local outlets. With the revised plan recommending a significant increase in harvest levels the local logging, trucking, and management businesses will certainly see additional economic opportunities. Furthermore, the placing of additional stumpage on the market will serve the local mill capacity (both in the US and Canada) to meet demands for raw materials.

[3] Gray Stevens, Smartwood Assessment of Essex Timber

PARCEL DESCRIPTION

Location and General Description:

To the original +/- 84,000 encumbered acres acquired from Champion, ETC added 1,483 acres in 2000, which are encumbered by a conservation easement similar to the original one, and has added 498 acres in fee in the last two years. The current UVA acreage is 86,262 acres. The final acreages were recently corrected to comply with town tax mapping.

The ownership is located in 14 towns in northeastern Vermont (Table 1): Averill, Avery's Gore, Bloomfield, Brighton, Brunswick, East Haven, Ferdinand, Granby, Lemington, Lewis, Maidstone and Victory in Essex County, Burke in Caledonia County, and Morgan in Orleans County.

The lands range north 30 miles from the town of Victory almost to the Canadian border, and west 20 miles from the Connecticut River Valley to VT RT 114. These lands are located amid more than 200,000 acres of conserved lands. This largely undeveloped expanse of forests, mountain peaks, ponds, and streams contributes greatly to the character of this region. In addition, these lands are important to the quality of life in the "Northeast Kingdom" and surrounding area. These lands have long contributed to the local forest-based economy, provided important fish and wildlife habitats, and have been a place for public recreation.

Table 1. Ownership Location

Town	Acreage
Averill	14653
Averill	812
Avery's Gore	8238
Bloomfield	9370
Brighton	5275
Brunswick	463
Brunswick	2277
Burke	370
East Haven	13464
Ferdinand	8115
Granby	4301
Lemington	9915
Lewis	6697
Maidstone	1461
Morgan	503
Victory	368
Total acres	86262

Natural Resources:

The lands are situated within the Northeast Highlands Biophysical Region. Cold temperatures, heavy snowfalls, short growing seasons, and thin, acidic soils characterize this biophysical region. The lands include six ecologically significant areas (as designated by the Conservation Easement), including areas of old growth forest, undisturbed wetland complexes, deer wintering areas, and relatively remote ponds. The lands include a wide variety of wildlife habitats, from ponds, streams, wetlands, and vernal pools to slopes of hardwood forest, softwood in lowland basins, and mixed-wood forests of various age classes and at elevations ranging from 850 feet along the Connecticut River in Lemington to more than 3,000 feet on the upper slopes of East Mountain in East Haven and Gore Mountain in Avery's Gore. Approximately 60% of the lands are hardwood types, 16% softwoods and 24% mixed woods. Northern hardwoods dominate hardwood types with spruce and fir dominant in the softwoods. The lands are home to over 200 different species of birds, mammals, reptiles, and amphibians. The boreal characteristics of the biophysical region reflect many of the species present.

Noteworthy species include boreal chickadee, rusty blackbird, black-backed woodpecker, mink frog, snowshoe hare, black bear, moose, and white-tailed deer. These lands contain some of the highest densities of moose in the State. The intensive timber management of the twenty years preceding ETC ownership has contributed greatly to the high habitat suitability of these lands for moose.

Recreational Resources:

Each of the private owners of these lands has successively continued the tradition of public access. Recreation on these lands largely mimics recreation on other large industrial forestlands across the Northern Forest. Public access has always been allowed for uses such as hunting, fishing, trapping, and bushwhacking. Today, snowmobiling is also a major activity. The Public Access Easement was created to formally preserve these traditions.

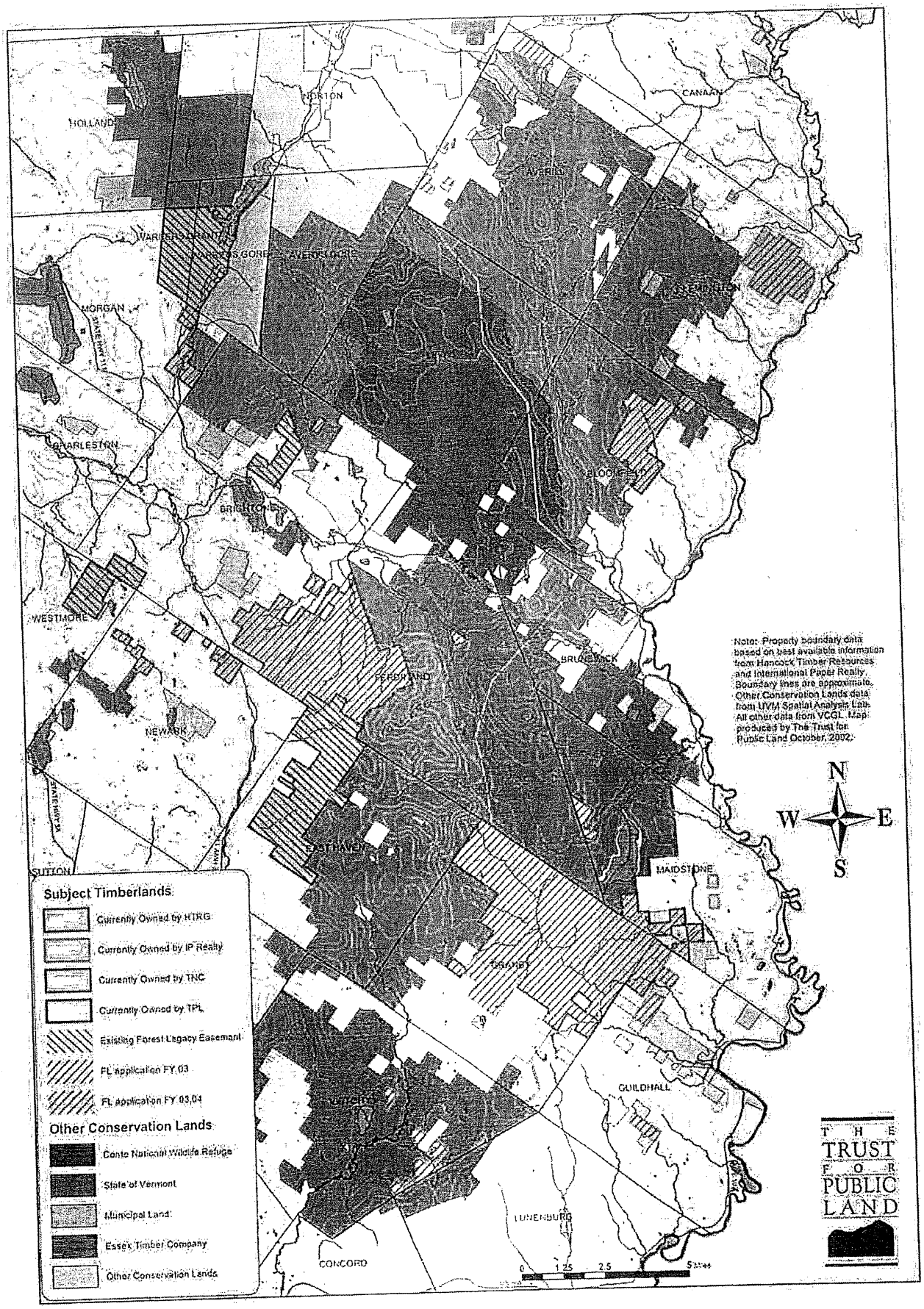
The Essex lands are served by an extensive system of gravel roads, winter roads and skid trails. While these were developed for forest management, they also provide recreational access to thousands of acres of land. Snowmobiles utilize about 117 miles of the road system during the winter months. The lands have also provided for hunting, fishing, berry picking, cross-country skiing, snowshoeing, and many other dispersed recreational activities. Notable recreation features include Sable Mountain, Madison Brook, East Branch of the Nulhegan River and Unknown Pond in Avery's Gore. Established recreation sites are very limited and primitive. They include access trails to ponds, rivers and streams, and aside from snowmobile trails, are informal and have been created and maintained by use, not by the landowner.

Current and past owners have had a longstanding recreational camp leasing program. Presently there are sixty-one camp lot leases on Essex Timber lands. Camp leases allow individuals or private associations to occupy and maintain privately owned camps for recreational purposes at a specified site. Those who were lessees upon the date of conveyance from Champion have lifetime leases, with an additional 20-year extension for their family members. At the end of that period the landowner may renew the lease, or let it expire, at the landowner's option. Those who have leased from Essex Timber since the date of conveyance have a five-year term that is renewable at the landowner's option. Recently, ETC has begun offering 15-year terms on its leases.

Other Conservation Lands:

The past decade has witnessed an increased effort by conservation groups in the Northeast Kingdom to conserve significant portions of the forested landscape. The Essex Timber Company lands are part of an approximately 200,000 acre, nearly contiguous parcel of conserved lands. The conserved lands are comprised of a combination of private ownerships encumbered with conservation easements, state lands and federal ownership.

Northeast Kingdom Conservation Lands



Geology & Soils:

The Essex Timber Company lands are located in the Northeast Highlands biophysical region of Vermont. The dominant bedrock type is granite. Soils are composed primarily of glacial tills. Detailed soils information for Essex County is not available, but the U.S. Department of Agriculture's Soil Conservation Service did some general typing in the northern portion of the property in 1977, finding four major soil types. These include the Peru-Marlow, Lyman-Marlow-Peru, Cabot-Peru, and the Muck and Peat-Peacham Associations. Because these types are representative of soils found in the region, it is reasonable to assume that they would also be the major soil types found on the rest of the ETC lands.

The major limitations for forest productivity and timber harvesting relative to soils is the presence of a hardpan within 24 inches of the ground surface. Field observations indicate that this is present over much of the property. The hardpan limits water movement and root development to the upper horizons, raising concerns of equipment operation and wind throw hazard on these sites.

Soil Associations[4]

Peru-Marlow Association: Deep, gently sloping to moderately steep, moderately well drained and well-drained, loamy and stony soils on mountains and foothills. The soils have a compact layer within 3 feet, contributing to wind throw and site damage and root injury during harvest operations. These soils are typical in the mid elevation/slope areas on the ownership. **Rating 63**

Lyman-Marlow-Peru Association: Deep and shallow to bedrock, sloping to moderately steep, well drained and somewhat excessively drained, loamy and stony soils on mountains and foothills. This soil type is generally associated with the higher elevations and ridge tops of the ownership. Limitations to forest management include excessively steep slopes and a shallow-to-bedrock condition. **Rating 61**

Cabot-Peru Association: Deep, gently sloping to sloping, poorly drained and moderately well drained, loamy and stony soils of the mountains and foothills. A compact layer is within 3 feet in most soils, contributing to wind throw and site damage and root injury during harvest operations. This type is typical in lower elevations and foothills, likely the soil type common along most stream courses and in mixed wood transitional zones along the bottom of slopes. **Rating 51**

Muck and Peat-Peacham Association: Deep, level, very poorly drained mineral and organic soils in depressions and wet side slopes. This soil association is typically associated with wetland areas on the ownership, and the Yellow Bogs area of the neighboring Conte Lands. **Non-rated**

On a scale from 1 to 100 the best soils are rated 1 (100) and the poorest quality soils are rated 7. The average value group for the soils on this ownership is 4.

[4] Soil Potential Study and Forest Land Value Groups for Vermont Soils, USDA, Soil Conservation Service, February 25, 1991

LANDOWNER OBJECTIVES

The landowner objectives provide guidance to the managers in developing a management system. They are:

1. To utilize the best available silvicultural modeling and planning to meet the owner's investment objective, and the principal objective of the conservation easement, which is to establish and maintain productive forestry resources.

2. To return the timber resource to a well-stocked condition, and then to produce a sustainable supply of high quality sawlogs over a long term involving a period of a full rotation, +/- 100 years.

3. To work with natural forest processes to promote good ecosystem health, land productivity, a sustainable wood flow, and sound economic returns.

4. To seek optimal utilization of high and low value forest products to both ecological and economic goals.

5. To manage the land as a commercial forest, while conserving the forest's non-commercial values, including plant, animal, water, soil and aesthetic values.

6. To manage the land as a commercial forest, while accommodating cultural, educational and recreational uses of the forest, and to coordinate those uses with abutting public and other eased lands.

7. To manage the land according to the terms of the conservation easement, State of Vermont Use Value Appraisal requirements and FSC Green Certification standards.

CONSERVATION AND PUBLIC ACCESS EASEMENTS

The property is encumbered by two easements, a working forest easement and a recreational access easement. Complete information can be found in the following documents, which have been recorded in each town of Essex's ownership:

- Champion International Lands Working Forest Grant of Development Rights and Conservation Restrictions ("the Conservation Easement"), dated August 6, 1999

- Champion International Working Forest Lands Grant of Public Access Easement, ("the Public Access Easement"), dated August 6, 1999

The Conservation Easement is jointly held by Vermont Housing and Conservation Board, and Vermont Land Trust, which has primary responsibility for easement monitoring and landowner contact. The Public Access Easement is jointly held by Vermont Housing and Conservation Board, and the state's Agency of Natural Resources (ANR), which has primary responsibility for easement monitoring and landowner contact. In addition to Essex's objectives, the management of the property is also governed in part by the terms of by the easements.

The principle objective of the Conservation Easement is:

> "to establish and maintain productive forestry resources on the Protected Property and, in consideration of the contribution timber products make to the economy and communities of the region and the State, to encourage the long-

term, professional management of those resources, and to facilitate the economically sustainable production of forest resources in a manner that minimizes the negative impact and the duration of impact on the surface water quality, recreational benefits to the public, wildlife habitat, and other conservation values".

As this plan was developed, the principal objective described above played a large role in the assessment of the forest resource inventoried in 2006, and in the recommended silvicultural strategies.

Upon acquiring an additional 1,483 acres in 2000, ETC sold a conservation easement to Vermont Land Trust encumbering this land that is practically identical to the original easement. This easement is held solely by VLT and is on record in the towns of Lemington and Bloomfield.

The influence of the easements goes beyond that of the landowner objectives. Language in the documents specifically addresses permitted uses and restrictions on the property, and sets forth a number of forest management prescriptions. To date, ETC has had a productive and effective relationship with all of the easement holders.

While the Public Access easement specifies that ANR has responsibility for public use of the land, and is the landowner's point of contact for public use matters, ETC also has good relationships with the users of the land, including recreation organizations, researchers and local residents.

LAWS AND REGULATIONS

The State of Vermont has few timber harvesting regulations at the current time. Those of greatest importance are:

- Act 15, the "Heavy Cut Bill", requiring an "Intent to Cut" notification to the Department of Forests, Parks and Recreation prior to any harvest that will reduce the residual basal area below "C-Line" stocking, over more than 40 acres.

- An Act 250 permit, required for all harvesting operations on elevations exceeding 2500 feet. This permit is subject to review from the Vermont Department of Fish and Wildlife.

- Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont, ("AMPs"). Though AMP compliance is normally voluntary, the Conservation Easement on the Essex Timber Company lands requires AMP compliance.

- Any wood chips marketed to Burlington Electric's wood to energy plant in Burlington, Vermont, or to the Ryegate Power Station wood to energy plant in Ryegate, Vermont are subject to a timber harvest approval by the Vermont Department of Fish and Wildlife.

- Use Value Appraisal or Current Use: The UVA program requires the preparation of a Forest Management Plan and compliance with the approved plan to retain a substantial reduction in the Grand List value of the enrolled acreage. This assessment is based on the "use" value of the land to produce sustained crops of timber. There is a lien on the tract and annual reporting is required.

BOUNDARIES

There are 185 miles of boundary lines associated with the property that are not associated with roads, utility rights-of-way or water bodies. Of these, 18.4 miles are in common with the USF&WS ownership (established and marked around 1999), and 4.2 miles are in common with the ANR (established in 1999 with layout currently underway by ANR).

While the majority of the property and the abutting properties are not surveyed, boundaries are generally clear and well marked by blazes and paint. The previous owners and their abutters have traditionally maintained these. A few sections, particularly around in-holdings, are difficult to find. Property corner monumentation has been found in all locations visited to date. There are no known property line disputes.

Over the last four years, ETC has made a substantial investment in boundary marking. Boundary lines are now on a maintenance schedule, prioritized by need, with blazing and painting occurring every 15 years or sooner if needed.

The preparation of the current Forest Type Map and its basis in the current aerial photography, in conjunction with overlaying adjoining GIS boundaries, found several conflicts on boundary lines with adjoiners and aerial photo evidence. Agreements were made with ETC's forest manager and adjoiners and the current map more accurately reflects known boundary lines on the ground.

TIMBER MANAGEMENT

Environmental & Natural Context

Silvicultural opportunities are influenced by the environmental conditions that exist. Soils, topography, moisture regimes, species characteristics and climate influence the silvicultural decision-making process for the ownership. The following are the principle environmental and natural conditions that will influence the silviculture on Essex land.

- Soils are generally shallow to hardpan, especially in S and SH types. There are better drained soils where the best H types are found. Sub-surface moisture regimes and rooting depths for trees are shallow and contribute to windthrow tendencies. Yet these are on the whole generally productive forest soils. The Habitat Classifications utilized in the Flex-Fiber Inventory and Growth modeling program (developed by the University of Maine and the US Forest Service), address the capabilities for land to grow and support various generalized timber types. These were key factors in accurately modeling the current and potential future growth of the forests of ETC. The science of Flex-Fiber is based on decades of research and high order modeling and assessment techniques.

- Soil moisture can contribute to site damage and root injury during harvest operations. The harvesting operations of Champion often negatively impacted soil hydrology leading to damage and decline in existing overstories. Where regeneration has become established the sites are better suited to this new growth than the support of suppressed and intermediate stems that have suffered root and basal stem damage and are less capable due to age to respond to release.

- The principle species present are shade tolerant and well suited to natural regeneration regimes that favor the establishment and release of pre-existing regeneration. On some sites current overstories of hardwood and hardwood dominated mixed wood are better suited to Spruce-fir growth in both pure and softwood dominated mixed wood structures.

This is a result of the mining of Spruce-fir in the Champion days. In other stands where Northern Hardwoods or Beech-Red maple cover types are and should be dominant, past management left a lack of suitable levels of AGS to allow for the continued development of a sustainable overstory.

- Regeneration is abundant and the principle tree species are prolific seeders. There are thousands of acres that have presently or are capable of developing into suitable regeneration class stands. But in many instances, especially over the last decade, the negative impacts of moose browsing have greatly hindered the development of a viable understory of AGS. In areas where the regeneration developed prior to the recent excessive moose populations the regeneration class is often excellent, well stocked and very productive. Release and/or regeneration treatments will be critical to attain suitable levels of advanced regeneration on many acres.

- Beech and Red maple sprouting is a potential concern. Selective moose browsing has created Beech brush fields and significant levels of Red maple that is present but demonstrates high moose browsing damage. A continued working relationship with Vermont's Fish and Wildlife Department and the Fish and Wildlife Board to better manage moose populations is an important element of the management of this resource.

- Beech bark nectria disease is a serious concern. The identification and retention of individual stems or clone groups of resistant Beech is imperative to the successful retention of a viable Beech component.

- The location of stands on the landscape can influence stand integrity. The ice storm of 1998 certainly demonstrated how aspect and elevation can have dramatic impacts due to weather and other natural factors. Further, the aspect and topography on a landscape sized ownership has a major influence on timber types, wildlife and other ecological services and values and their distribution across the ownership.

- Species silvical characteristics and stand compositions provide a variety of regeneration options. While this is certainly true, the aforementioned moose browsing impacts have dramatically influenced the success of both planned and unplanned regeneration opportunities. Care will need to be taken in the planning and implementation of future regeneration entries to better insure success. Control of the moose population at or below the carrying capacity of the forest resource is the single most important future component of regeneration management of ETC and the surrounding forest resource

- Species of the Northern Forest are well suited for both even and uneven-aged silvicultural systems. The qualifier in this discussion is that due to the past history of management, prior to ETC taking possession of these lands, the development of true uneven-aged forest strata will take many decades to create and sustain the complex structures of true uneven-aged stands. Too often the forest stands currently present need to be set back with the use of even-aged treatments so that a sufficient stocking level of AGS can be developed to allow for uneven-aged practices to be implemented over a very long and patient time horizon.

Historical Context

Consistent with many landowners in the northern forest of New York, Vermont, New Hampshire and Maine, ETC's timber resource is the product of a long history of industrial management and market driven harvesting. The harvest operations implemented by the previous owner often responded more to markets than to a long-term management plan based on sound silvicultural modeling.

Although markets for hardwood pulp had existed in this region for more than a century, the lands of Essex Timber were a relatively long haul. This was typically the last volume of pulp purchased by the mills because of the higher cost associated with the longer distances. This situation changed in the mid-1980's as world paper markets adapted to the use of hardwood fiber. Domtar, a Canadian paper company, built a state-of-the-art pulp and paper facility in Windsor, Quebec approximately 65 miles from the center of the Champion ownership in NH and VT. Champion capitalized on this new market and dramatically increased the harvest levels of hardwood from this region.

Salvage was the principle objective in managing the softwood resource on the ownership. The spruce/budworm epidemic of the late 1970's and early1980's ravaged the spruce/fir resource. Salvage operations resulted in extensive clear cutting of large softwood valleys and softwood flats resulting in extensive even-aged forest stands.

During its tenure, ETC has had a light harvest approach, concentrating on removal of lower quality stems declining stands, and attempting to allow net growth. But as revealed by the recent inventory, overstory growth rates are considerably slower and decline is more rapid than had been anticipated, and insufficient net growth has occurred.

Current Conditions

The historic treatment of these lands has resulted in a number of conditions that will drive the silvicultural decision-making on Essex Timber in the immediate future (5-10 yrs) as well as over the period of the next rotation. The following conditions generally apply:

- The softwood resource has been largely regenerated. Stands are now approaching 20 yrs of age and are classified as large sapling/small pole size. These often have scattered but still economically feasible overstories available for removal.

- The current inventory found a vigorous and well developed S1A type and a growing and expanding S2A type as well. There are pockets of mature softwood left in both isolated small units as well as strong Spruce-fir components in the SH and HS mixed wood types

- The Spruce/fir resource is underrepresented relative to its potential on the ownership. Observations made from the new forest type mapping and field observations during the inventory further reinforce this view. Quite often the selective removals of softwood in mixed wood types left HS overstories with strong Spruce-fir seedling and sapling classes in the understory. With careful overstory removals this advanced softwood regeneration can be released.

- The hardwood resource has been high-graded through the historical use of diameter limit cuttings. The net effect has been the establishment of large blocks of regenerated, even-aged hardwood and mixedwood stands – crudely referred to as two-storied. The inventory and growth modeling carried out by LandVest in 2006 clearly demonstrates that this has left not only two-storied stands, but often stand types with an overstory of low quality and declining hardwood that is losing volume and providing little growth.

- The beech resource is in serious decline as the result of the beech nectria disease. The 2006 inventory further reinforces this view as typically the Beech tallied fell into the UGS category and has poor form and vigor. Undesirable beech regeneration is becoming a significant problem in some areas as previous harvest practices have inadvertently promoted beech regeneration through sprouting and coppice regeneration. Further impacting the long-term development of the forest is that Beech is not preferred by deer or moose as browse and due to selective browsing there are Beech brush fields on some acres. This potential may have to be dealt with via mechanical or chemical extraction to promote the development of more valuable and viable commercial species.

- The regeneration present in many of the two-storied stands from harvests of greater than 12 years old is of good to excellent quality. More recent regeneration has suffered significant moose browsing that has hindered understory development and in some cases reduced regeneration success. The 2006 inventory carried out both regeneration and moose browse surveys. That data will be crucial in the modeling and planning for future management planning on the ETC ownership.

These conditions will significantly influence the management decision-making on the ownership over the next ten years, and how that ultimately impacts the period of development for the next biological forest rotation, +/- 100 years. Silvicultural objectives will be directed toward improving and correcting these conditions through a sound program of early rotation activities that will led to a healthier and more viable plan and stand structure for the longer term rotational time line. This plan is structured to return many declining stands to a regenerative phase, and allow stocked and healthy stands to grow.

Financial Considerations

ETC purchased its land in a competitively bid process, and it did so with the expectation of making a competitive rate of return on the capital committed. While the Conservation Easement removes all development value from the land, it also protects the landowner's right to manage the parcel as a working forest. (See the principle objective of the Conservation Easement cited above.) This plan is in keeping with those principles. ETC's returns thus far have been deliberately modest, but the timber management contemplated here intends to enable the land to produce a greater volume of higher quality products indefinitely.

EASEMENT AND OWNER OBJECTIVES

The objectives set out by the easements and the landowner further build the framework for formulating the silvicultural approach. Both the landowner objectives and the easements seek the establishment and culture of forest stands capable of producing high quality, large diameter sawlogs while maintaining a healthy and biologically diverse forest. The following language is from the Purposes section of the Conservation Easement:

> a) Manage forest stands for long rotations that maximize the opportunity for harvesting, sustained over time, of high quality sawlogs while maintaining a healthy and biologically diverse forest. Grantor and Grantees acknowledge that site limitations and biological factors may preclude the production of high quality sawlogs, and further that the production of a variety of forest products can be consistent with the goal of producing high quality sawlogs. "Long Rotations" means management for the production of target products consisting of saw timber quality trees within a range of at least the following diameters at breast height (DBH), where conditions are adequate:

Sugar maple, white ash, yellow birch - 18" - 20" DBH
Beech - 16" - 18" DBH
Paper Birch, Red Maple - 14" - 16"DBH
Red Spruce - 14" - 16" DBH
Hemlock - 18" - 20" DBH
White Pine - 20" - 22" DBH

b) Manage the Protected Property for diversity of age classes, native tree species, and vertical structure, and to establish and retain standing dead and down large diameter trees in order to achieve the secondary objective of this Grant. For downed material, the desired outcome should include two 16" or greater logs per acre.

ETC's first objective is:

To return the timber resource to a well-stocked condition, and then to produce a sustainable supply of high quality sawlogs.

With the results of the recent inventory, it is clear that reaching any of these objectives will require a change from the relatively passive management of the past seven years. Many timber types on ETC lands have underperforming overstories. As described more fully below, the goals now are a) to either release or develop regeneration, b) retain AGS wherever it is available and sufficient enough to form the basis for continued forest stocking, and c) to gain an acceptable return on the investment.

The conservation easement for this tract emphasizes the production of high quality sawlogs. This indicates an important role for the removal of poorly performing stands, to be replaced by regeneration that can then be better managed for sustainable production into the future. ETC believes that this resource is well placed and capable, with careful silviculture, of growing and maintaining a valuable and vigorous forest that can meet the objectives of the easement and the landowner.

Part II – 2006 Inventory

METHOD

ETC contracted with LandVest Timberland to complete a 3-phase management plan development:

- Color infrared aerial photography at leaf blush in May of 2006.
- A new type map was developed from these photographs.
- A stratified cruise during the summer of 2006 of 954 randomly located point samples.

Aerial photo interpretation by subcontractor Group Alta resulted in an initial 56 timber types that were then combined into 29 strata for the initial cruise layout. These strata were then inventoried and the data was run for those 29 strata. Once those strata outputs were analyzed a further combination was made bringing the management plan strata total to an adjusted to 17 strata. All original cover types are retained and the 17 strata are found in the Appendix with the types comprising the final 17 strata. The maintenance of the various sub-types is very useful for planning and the implementation of management as the various sub-sets of forest types will provide ETC with more actively available data for decision making and planning within the strata. The inventory plots were derived from a set of random numbers based on a 5 x 5 chain grid set up on the entire ownership. From those random starting points LV biometric staff developed a computer routine that located points based on the needed distribution of points per strata, and to insure that an unbiased sample set the points on the ground based on the random starting points and the objective review process of the computer model. This created many lines on the ownership that varied from a maximum of 10 points per line to single randomly located points. This process utilized a number of scientific advances to create an unbiased and useful inventory result. No points were placed in easement buffers where forest management is prevented. From the results of the inventory, new Strata Stand and Stock Tables were developed, a new Type map was completed, and this plan was developed.

Each strata found in Appendix C is as homogenous in structure as is reasonably possible on an ownership of this size and diversity. The past harvest history, the unbiased nature of the point location, and the nearly 40 years of LandVest's managing northeastern forests allowed LV to develop these strata with a high degree of consistency and accuracy. A new set of aerial imagery was combined with high tech forest typing and stand type map develop in a modern GIS system to provide a clean slate from which to build types, strata and the plan. These very accurate forest typing elements were of great value in the development of the stratified cruise. The investment in up to date mapping resulted in more accurate and useful inventory data.

In addition to traditional data collection such as species, diameter and stem quality and products, LV also collected information on regeneration, moose browsing, insects and diseases, wildlife habitat, coarse woody debris and silvicultural options at each point location. LV is very comfortable with the outcome of the inventory. ETC now has an up to date and highly reliable inventory to serve as the basis for the development of a sustainable working forest management plan. Information on coarse woody debris, standing dead trees and moose browse impacts on forest regeneration have been included in this plan. As a better understanding of what types of analysis should be accomplished, ETC now has the base line data to accomplish those and better assess these non-traditional forest values.

INVENTORY RESULTS

The 2006 inventory demonstrates that the property holds 14.80 cord equivalents [at the 2.0 cords per MBF conversion] per forested acre. This subtotals as follows.

Sawlogs	1.756 MBF
Tie Pallet	0.061 MBF
Boltwood	0.282 MBF
Cordwood	9.6 Cords
Growing Stock	1.00 Cords

Total Cords on 81,842.9 commercial acres: 1,212,446.20

(See Appendix B for Specifications and Appendix C for Strata Stand and Stock Tables)

It is significant that the current inventory volume is only 2.12% greater than the inventory done by Wagner Woodlands in 1999, even though harvest levels in the intervening years were very light, averaging only 7,539 cords per year, or .08 cords per acre per year.

Cord Equivalents [at the 2.0 cords per MBF conversion] for the 1999 Wagner Inventory

1999 Inventory:	1,187,210 Gross Cords
Adjustments and Estimated Changes	
Acquisitions (est.):	+8,500
Removals:	-45,232
Implied Growth/Mortality:	+53,432

2006 Estimated Inventory: 1,203,910

LandVest believes this low growth level is due to the history of previous owners high-grading that left many stands stocked with released suppressed and intermediate stems. In addition, many remaining stems were negatively impacted by poor logging practices of the previous owners, further reducing stand vigor and contributing to loss of volume due to mortality and decreased growth rates on overstory stems. In addition, there has been lasting impact from the 1998 ice storm.

While LandVest believes that growth is strong on the ownership, it is now disproportional in its distribution to understory regeneration, fully released saplings, and smaller diameter poletimber that is young, vigorous and capable of rapid growth on these productive forest soils. Much of the volume in this size class does not appear in the 2006 volume table due to it falling in the sub-merchantable size classes of under 5 inches DBH. While the small diameter poletimber, in the 5-7 inches classes, is accounted for in the inventory, the real story of additional growth is often associated with these sub-merchantable stems.

FOREST STRATA

ESSEX TIMBER COMPANY LLC
ACREAGE BREAKDOWN

STRATA OR CLASSIFICATION	ACREAGE	PERCENT OF SUPER STRATA ACRES	PERCENT OF FORESTED ACRES
H1B	1521.2	3.1%	1.9%
H2B	4236.7	8.8%	5.2%
H3B	16236.9	33.6%	19.8%
H3B/H2B	11120.8	23.0%	13.6%
H3C	9581.7	19.8%	11.7%
H4C/HS2B	5624.7	11.6%	6.9%
HARDWOOD TOTAL	**48322.0**	100.0%	59.0%
HS2-3A	831.2	4.2%	1.0%
HS2A	852.3	4.3%	1.0%
HS3-4A/HS2B	2357.4	12.0%	2.9%
HS3B	13021.4	66.1%	15.9%
HS3C/HS2C	2636	13.4%	3.2%
HS MIXEDWOOD TOTAL	**19698.3**	100.0%	24.1%
S1A	999.7	21.5%	1.2%
S2A	3660.2	78.5%	4.5%
SOFTWOOD TOTAL	**4659.9**	100.0%	5.7%
SH3-4A/SH2B	1222.5	13.3%	1.5%
SH3-4B/SH2B	5836.5	63.7%	7.1%
SH3C/SH2B	1008.5	11.0%	1.2%
SH3-4C/S2B	1095.2	12.0%	1.3%
SH MIXEDWOOD TOTAL	**9162.7**	100.0%	11.2%
FORESTED ACREAGE TOTAL	**81842.9**		
NON FOREST CLASSIFICATIONS			PERCENT OF TOTAL ACREAGE
CLEARINGS	153.6	3.5%	0.2%
FLOWAGES/BOGS	428.8	9.7%	0.5%
GRAVEL PITS	21.3	0.5%	0.0%
OPEN AREAS	21.2	0.5%	0.0%
ROADS	1073.2	24.2%	1.2%
RIPARIAN BUFFERS CE	2641.6	59.5%	3.1%
WATER	99.4	2.2%	0.1%
TOTAL NON-FOREST	4439.1	100.0%	5.1%
TOTAL PROPERTY	**86282**		

The broad forest type breakdown illustrates the manner in which hardwood acreage is the dominant super Strata on the ownership. With infra-red aerial photos flown in May of 2006 and professional aerial photo interpretation, this updated map is as accurate as current economically feasible technology allows.

Overall there is a good mix of forest types which are then combined for modeling and planning purposes into the 17 Strata represented here and throughout the plan. Fortunately due to the technology of GIS while we plan at the Strata level the mapping and digital data retains the original 29 forest types in the system. By accessing these sub strata level types planning for operational units by the manager of Essex Timber will be streamlined and more readily apply management where it is most timely and appropriate within a Strata.

Description of Forest Types

Listed below are the most frequently found forest cover types on the ETC that are derived from Eyre, F.H. SAF Cover Types of the United States and Canada. 1980 where an * refers to a citation from the text above. In general, the property is hardwood dominated with the Sugar maple-Beech-Yellow birch cover type being the most commonly found throughout. This is partly due to the range of sites within the type that also dovetails with the variability found within the forest on any one given acre. The second most prominent type would be the mixedwood type of Red spruce-Sugar maple-Beech where there is more of a dominant hardwood component. Lastly, is a classic Spruce-fir type that occupies the remainder of the site spectrum from the tops of mountains and along riparian zones to areas of very poor drainage that are considered restrictive sites.

Red spruce- Balsam fir #33

This type is generally found with the two primary species (Spruce-fir) being the dominant component. However, exceptions abound depending on site, elevation, previous disturbance etc. Occasionally, an area will be occupied by a nearly pure Red spruce component or possibly the opposite with Balsam fir as the dominant species present. Another scenario commonly found within this type is the presence of associated species such as Northern white cedar, Paper birch, Yellow birch, Red maple and Aspen.

The type tends to occupy two different kinds of sites: 1) the imperfectly to moderately well drained flats, low ridges and knolls surrounding lakes, streams, swamps, bogs and continuing to the base of lower mountain slopes. 2) well-drained to excessively well-drained upper mountain slopes characterized by steepness, rockiness and shallow soils. The former is commonly termed a Spruce flat and the latter a Spruce slope. Unlike the zone of relatively deep, fertile, well drained soils that separate them, neither the Spruce flats nor the Spruce slopes provide an environment conducive to the strong establishment of Northern Hardwood types.

Common shrubs and site indicators include: Creeping snowberry, Raspberry, Witch-hobble, common Wood sorrel, False Lilly-of-the-Valley, Blue Bead Lily, Star flower, Goldthread and Purple Trillium.

Red spruce-Sugar maple-Beech #31

This type is characteristic of a hardwood dominated mixedwood stand that is frequently encountered across the ownership. Its prevalence is at the Cover type level to micro sites or even small pockets within a stand. In essence, this Forest type may be perceived as a quality secondary hardwood site that has a modest (variable) softwood component. The species composition is characterized by a varying Red spruce component that accounts for at least 20 percent of the basal area. However, this softwood component is not limited only to Red spruce but may also include Balsam fir or on rare

occasions Eastern hemlock. Other common deciduous associates include Yellow birch and Red maple. * Undergrowth includes, False lily-of-the-valley, Wild sarsaparilla, Blue bead lily, Solomon's seal, Partridgeberry and Wood sorrel. Related shrubs to the type also include Hobblebush and Honeysuckle.

*" This cover type is confined to sites where both edaphic and climatic parameters come sharply into play. It occurs especially in the higher elevation ranges of Sugar maple and Beech. The type tends to be site specific and is restricted to coarse, open-textured, un-compacted acidic tills. Thus, the sites are most frequently deep, well-drained soils located on lower slopes of mountainous areas or on other sites with equivalent ecological and topographical characteristics: upper slopes of hilly areas, benches and gentle ridges."

Sugar maple-Beech-Yellow birch #25

Within this forest type are numerous Northern Hardwood variations of this type; however this association best describes a majority of what is found across the ownership. Variations are usually expressed by a change in site, slope and / or aspect. Common species associated with this type are White ash, Black cherry, Red maple, Basswood, Red oak, Eastern hophornbeam, White pine and to a lesser extent Spruce-fir. After a disturbance of any nature, early successional species such as White birch, Aspen and Pin cherry are likely to become established within this Type. *Best development of this type occurs on moist, well-drained, fertile loamy soils. Sugar maple, its principal component, unifies the association and is the least site-sensitive of the three species. It is absent only at the extremes of soil drainage. Where the type occurs on wet sites, it blends into a Red maple-Yellow birch-Hemlock mixture. On the drier sites Beech becomes increasingly prominent. Throughout the range, the blending of different subtypes and variants, past land use, cutting histories, soil characteristics, and differential deer (and moose) browse all significantly affect condition, structure and composition of the type.

On the forest floor, it's common to find and relate Hobblebush, Service berry and Witch hazel as common associated shrubs within this forest type. Moreover, Jack-in–the-pulpit, Violets, Wood sorrel, Lady-slippers and Trilliums are other broad site indicators of this forest type.

Red maple # 108

Mostly a type that forms on poor sites found near wetlands and on poorly soiled hilltops or rocky ridges where it out competes other species. Some acres within this forest type may be a result of previous harvesting practices, where the Red maple was of such poor quality that it has been left repeatedly as a residual. Spruce and fir are both found with this type near wetlands and poor sites, while White birch and Beech most often show up on more loamy upland sites. This forest type is rarely found in large tracts and frequently occurs as small scattered stands that shift in and out of other types.

Tree species found in the understories of this type are usually Beech, Red maple suckers and / or Striped maple. Herbaceous growth can be thick when near open areas around wetlands, with shrubs such as Winterberry, Mountain holly, Maleberry and various native Dogwoods in addition to ferns such as Interrupted, Cinnamon, Royal and Sensitive.

Beech–Sugar Maple # 60

*Beech and Sugar maple together generally comprise a majority of the stocking, but the stands composition may vary from stands composed entirely of Beech–Sugar maple to a mixture of species. In New England, associates in the lower elevations include Yellow birch, Paper birch, Eastern hemlock, White ash, Red spruce and Balsam fir in higher elevations.

*Generally the type is found on moist, well-drained soils with a Northern aspect. Generally, on drier sites, Beech associates with White ash, White pine, Eastern hemlock and Aspens. On the more acidic soils, Beech and Red maple are a more common combination. Where disturbed repeatedly by cutting or fire, Beech has a tendency to dominate. Often this type occurs with a variety of other species and many consider it to be a remnant of the Sugar maple-Beech-Yellow birch type. In young even-aged stands, short-lived species such as Pin cherry and Sumac are often quite prominent. Also, Yellow birch and other shade intolerant species such as White ash, Basswood and Black cherry are more common than in older stands. In mature stands, understory trees, shrubs and vines are more prevalent; they include Striped maple, Hop Hornbeam, Serviceberry and Hawthorn. Some of the herbaceous plants on better sites include blue cohosh, jack-in-the-pulpit, trilliums and maidenhair fern. On poorer sites herbaceous plants and ferns are not as plentiful where grasses and sedges often dominate the undergrowth.

Age Class Distribution

Classification of the forest by age class provides an indication of long-term timber resource sustainability. Significant gaps in the distribution of age classes points to difficulties that can arise in the future in terms of merchantability and operability of the timber resource.

The broad forest type breakdown continues to illustrate the high percentage of hardwood acreage on the ownership, though the overall percentage has decreased some due to new infrared photography and the retyping of the property.

As with the previous management plan, broad forest types were classified into estimated age classes to illustrate the development of the timber resource. Assumptions in allocating acreages previously made were held for comparison purposes. Sixty percent (60%) of the 3C and 100% of the 3D acreage were allocated to the 0-20 year age class as these were considered to be largely non-merchantable stands. To better approximate those acres and sub-groups that are greater than 60 years old, 40% of the 3A&B acres and all of the 4 size class acres were allocated to the 60-100 age group.

Age Class Distribution -2006 infra-red photography

ACRES	0-20	21-40	40-60	61-100	Total
H	7270	4237	20247	16568	48322
HS	1582	1684	10282	6152	19698
SH	1262	0	5077	2824	2824
S	1000	1830	1830	0	4660
Tot	11114	7750	37436	25543	81843
% Tot	13.6%	9.5%	45.7%	31.2%	100.0%

Age Class Distribution -1999 Orthophotos

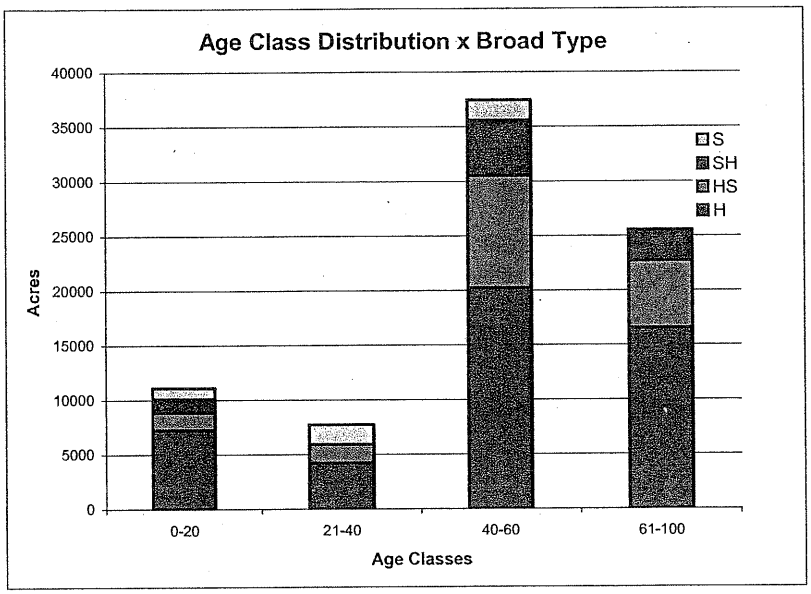
ACRES	0-20	21-40	40-60	61-100	Total
H	16101	3164	27040	13177	59482
HS	2074	413	5532	3167	11186
SH	601	860	2219	1420	5100
S	1576	1347	1477	842	5242
Tot	20352	5784	36268	18607	81010
% Tot	25.1%	7.1%	44.8%	23.0%	100.0%

A comparison of the two classifications indicates that there remains a deficiency in the 21-40 year age class. The older age classes have become better represented, and less of the ownership is in the 0-20 year age class.

Though some of the shifts in the analysis can be credited to new photography and perhaps additions to the ownership, there does appear to have been some upward shifting in terms of age class distribution.

The following figure graphically illustrates the age class distribution using the values in the table above. The deficiency in the 21-40 age class is clearly evident. As with the previous plan, a future potential deficiency of pole and small saw timber-sized trees is even more evident than previously believed if low volume removals continue.

Age Class Distribution - 2006 infra-red photography



In order to illustrate the impacts of applying the approach recommended by the modeling, two approaches were taken.

LandVest developed a Stand Visualization Report (see appendix). In this process a stand visualization system (developed by the U.S. Forest Service) was run utilizing the recommended treatments for each stand type. After all simulations were completed, all stand types were grouped into the four strata of hardwood, HS mixed wood, SH mixed wood, and softwood, using weighted acreages. Each of the four strata was run through the visualization system and a stand summary, diameter, height and species distribution was obtained for each.

The second approach was to expand on the classifications of estimated age classes to illustrate the development of the timber resource. To accomplish this the acreages by type were allocated based upon treatment, type of treatment, and the priority for treatments. Assumptions used to allocate acreages for existing age classes were carried forward. In addition, it was assumed that most, but not all acreage in each type would receive the priority treatment. For example, not all of the H3B type would be treated with an overstory removal, but instead those H3B stands with good stocking would be treated with a thinning or other intermediate treatment, and therefore carry on to an older age class. Stands with developed advanced understories would not all be set back to the 0-20 year age class, but instead a significant component of these types would fall in the 21-40 year age class.

ESSEX TIMBER COMPANY LLC
ACREAGE BREAKDOWN & AGE CLASS ALLOCATION

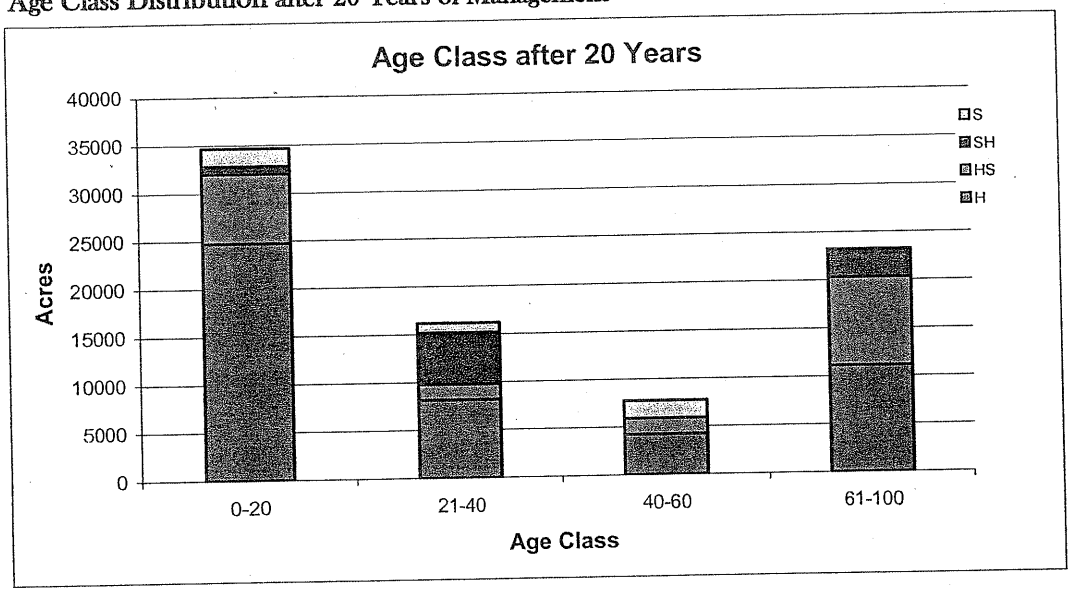
STRATA OR CLASSIFICATION	ACREAGE	PRIORITY	TREATMENT	AGE CLASS ALLOCATION
H1B	1521.2			21-40
H2B	4236.7			41-60
H3B	16236.9	5	OSR	20% 61-100; 80% 0-20
H3B/H2B	11120.8	3	OSR	20% 61-100; 60% 21-40; 20% 0-20
H3C	9581.7	6	CLT	0-20
H4C/HS2B	5624.7	5	IT	61-100; uneven-aged mgmt
HARDWOOD TOTAL	**48322.0**			
HS2-3A	831.2			41-60
HS2A	852.3			41-60
HS3-4A/HS2B	2357.4	4	IT	60% 61-100; 40% 0-20
HS3B	13021.4	5	IT	60% 61-100; 40% 0-20
HS3C/HS2C	2636	2	CLT	60% 21-40; 40% 0-20
HS MIXEDWOOD TOTAL	**19698.3**			
S1A	999.7			21-40
S2A	3660.2	2	OSR	50% 41-60; 50% 0-20
SOFTWOOD TOTAL	**4659.9**			
SH3-4A/SH2B	1222.5	4	OSR	21-40
SH3-4B/SH2B	5836.5	3	IT	50% 61-100; 50% 21-40
SH3C/SH2B	1008.5			60% 21-40; 40% 0-20
SH3-4C/S2B	1095.2	1	OSR	60% 21-40; 40% 0-20
SH MIXEDWOOD TOTAL	**9162.7**			
FORESTED ACREAGE TOTAL	**81842.9**			

This process provides us with a look at how applying the priority treatments will impact the age class distribution across the ownership on a strata basis in 20 years. The following table and figure illustrate the results.

Age Class Distribution after 20 Years of Management

ACRES	0-20	21-40	40-60	61-100	Total
H	24796	8194	4237	11095	48322
HS	7206	1582	1683	9227	19698
SH	842	5402	0	2918	9162
S	1830	1000	1830	0	4660
Tot	34674	16178	7750	23240	81842
% Tot	42.4%	19.8%	9.5%	28.4%	100.0%

Age Class Distribution after 20 Years of Management



While the resulting imbalance in age class distribution is inconsistent with the secondary purpose in the Conservation Easement that requires maintaining a diversity of age classes and native tree species, it in fact is more advantageous than the imbalance illustrated in the previous management plan. In its first seven years, ETC has tried a very light hand in harvesting, expecting younger age classes to develop. But the 2006 inventory showed that this approach was not resulting in the kind of growth that the land is capable of producing. While the CE anticipates a growth rate of .38 cords per acre per year in hardwood stands, and .44 cords per acre per year in softwood stands, the "let it grow" approach has resulted in significantly less actual growth.

LandVest believes that age class distribution, especially in light of the health, quality and vigor issues related to the older age classes on this forest are an early rotation management issue that if properly addressed will allow for the long-term solution of the establishment and growth of a much more vigorous and high quality forest. To achieve this age class distribution goal we are addressing it early on by, in many instances, rolling over the current undesirable over story into a quality and fast growing regeneration and pole timber stand structure. These new stands can then be managed more aggressively moving forward to attain the more desirable age class distribution. The plan is to address this through silvicultural modeling and implementation of strategies designed to improve the resource and establish a higher quality forest. As the principal goal of the CE is to establish and maintain a productive forestry resource it is essential that we utilize the best available silviculture to stock as many acres as possible with the most vigorous and highest quality growing stock. As noted in the 1999 plan, the land had a reasonable age class distribution. But the reality is that many acres on ETC need to be regenerated because of the many low quality and less than vigorous over stories that prevent the forest from moving toward the goal of producing high quality saw timber. It is neither economically nor silviculturally desirable to continue growing unacceptable growing stock further into the future.

Previous owners often utilized high grading techniques that targeted the most vigorous and dominant stems, which often resulted in B- stocking levels of released suppressed and intermediate stems. In addition, extremely poor harvesting practices led to high proportions of the residual stems suffering from logging wounds, compressed soil and root damage. Finally, the 1998 ice storm provided even more damage. These stand conditions are not a good foundation for the development of a sustainable forest resource.

While growing high quality sawlogs is a main objective, ETC also recognizes the need for early successional age classes. Essex Timber will support the use of clear cutting, seed tree and overstory removal harvests to maintain 15%, or

approximately 12,000 acres of the ownership in the 0-20 year age class during any 20-year period. This goal will be exceeded in the next several decades as levels of AGS are enhanced so future commitments to age and size class diversity can be achieved. Eventually, about 55% of the ownership will be in mature and late succession stands.

The LandVest inventory, and subsequent modeling, demonstrates that to gain a forest capable of sustained yields of high quality saw timber, action must be taken now that in the short-term will set age class back, but still provide for some age class diversity. The removal of low volume, low vigor, and low quality over stories will be the best means for economically and ecologically turning this forest around so that the quality of the forest soils on ETC can be used to grow more wood, of higher quality more sustainably. For these reasons, LandVest recommends moving harvest levels from the current +/- 7,000 cords per year to over four times that level.

SPECIES COMPOSITION

The inventory carried out by LandVest in 2006 verified the base principles laid out in the original ETC forest management plan that there is a tendency for these lands to be occupied by tolerant species that are striving to develop late succession stand structures. It was further observed from the data that while the acreage of H types is the dominant cover type, +/- 48,000 acres or nearly 59% of the acreage, Spruce and fir comprise almost 52% of the sawtimber and 37% of the growing stock., while only being found in pure types on +/- 4,700 acres and dominant on another 9,200 SH types. Adding in the HS types that carry a fair amount of Spruce and fir and will likely develop a stronger SF component in the future, those types represent nearly 34,000 acres. Over time managers will continue to use silvicultural entries to favor the growth of Sugar maple, Yellow birch, Red spruce and White pine, over species such as Red maple, Balsam fir and White birch. But it is important to note that natural stands will always dominate and while species can be favored it is not practical, nor desirable, to move away from a naturally diverse forest.

Table 7 presents the revised existing species composition breakdown of the merchantable timber on Essex Timber.

Table 7. 2006 Current Species Composition by BA & T/A FOR STEMS 1-36 INCHES DBH

SPECIES COMPOSITION BY BASAL AREA AND TREES/ACRE for TREES 1-36 INCHES DBH		
SPECIES	BA PERCENT	T/A PERCENT
Balsam Fir	16.3	20.6
Red Spruce	8.7	8.4
Hemlock	1.0	0.1
Northern White Cedar	1.0	0.2
Tamarack	<0.1	<0.1
White Pine	0.1	<0.1
Sugar Maple	19.9	11.0
Red Maple	7.6	5.4
Yellow Birch	25.5	15.5
White Birch	8.2	8.2
White Ash	0.2	0.1
Black Cherry	0.1	0.1
Beech	6.4	10.2
Aspen	0.5	0.9
Brown Ash	0.1	<0.1
Other Hardwoods	4.5	19.1

Table 8. 2006 Current Species Composition by BA & T/A FOR STEMS 4-36 INCHES DBH

SPECIES COMPOSITION BY BASAL AREA AND TREES/ACRE for TREES 4-36 INCHES DBH		
SPECIES	BA PERCENT	T/A PERCENT
Balsam Fir	15.4	22.7
Red Spruce	8.4	9.9
Hemlock	1.1	0.4
Northern White Cedar	1.2	0.8
Tamarack	<0.1	0.1
White Pine	0.1	0.1
Sugar Maple	21.9	17.8
Red Maple	8.1	6.2
Yellow Birch	27.5	21.0
White Birch	8.2	8.4
White Ash	0.2	0.2
Black Cherry	0.1	0.2
Beech	5.7	7.2
Aspen	0.3	0.5
Brown Ash	0.1	0.1
Other Hardwoods	1.8	4.7

Silvicultural activities will be designed to maintain or slightly increase the percent of Hard maple over the birches and significantly increase the total volume of Spruce and fir on the ownership relative to its current position. The goal of moving Sugar maple forward at the expense of Yellow birch may be difficult in the short-term due to the identified need of implementing regeneration harvests and the excellent conditions created by light and disturbance that birches favor often being the outcomes of those

harvests. Yet long-term as the sustainability and size class goals are strived for, Hard maple should become a larger component of the forest. There still is that goal, the current inventory clearly demonstrates that achieving that desire will require a more significant passage of time as the regeneration harvests planned will favor Yellow birch and other more intolerant species on ETC. Currently the greatest effort will be directed toward increasing the percentage of Spruce, as this species has been significantly depleted over time through discriminatory harvesting.

Softwood Composition –

Essex Timber lands are comprised of 59% hardwood as classified by broad forest type and just over 83% hardwood when the HS broad type is included as a hardwood type. As a percentage of the lands in one broad forest type, this is significantly above the average for lands in northern NH & VT. When reviewing past harvest practices and market opportunities that drove management through the latter half of the 20th century, it appears that the percentage of softwood acreage on this ownership has been reduced through past practices that repeatedly targeted softwood logs and pulpwood as preferred species and products for harvest. This inevitably resulted in a shift or "loss" of softwood acres as they moved from S of SH types to mixtures with more hardwood– SH & HS. This also resulted in the near extirpation of softwood from hardwood stands.

One of the silvicultural objectives for this ownership is to slowly reverse this pattern and increase the percentage of softwood volume and acreage at the stand and landscape levels. Spruce, pine and hemlock are species that should be increased. This objective is in line with the stated management objective of maintaining the diversity of native tree species.

Ecologically, increasing softwood composition, appropriate to the land's capacity to grow it, accomplishes the goal of more precisely matching species composition with site potential. This is a major consideration when planning long-term management designed to capitalize on the forest's natural productive capacity.

This objective will not be achieved at the expense of growing quality hardwood sawtimber. More accurately stated, this goal will improve the ecological health and quality of the forest and the timber resource on Essex Timber.

OVERALL TRACT TIMBER VOLUME

The following page summarizes the current tract inventory into four broad product groups, Sawtimber/Pallet, Boltwood/Flooring, Pulpwood and Growing Stock. The following table represents those numbers for the ownership as a whole.

Table 2 LandVest Timberland Timber Volume Table

TIMBER CAPITAL VALUE ESTIMATE
FOR THE LANDS OF ESSEX TIMBER COMPANY LLC
ESSEX AND CALEDONIA COUNTIES, VERMONT
December 1, 2006

86,282 TOTAL TRACT ACREAGE

81,843 FORESTED ACREAGE

	TOTALS	VOLUME AND VALUE					
SAWLOGS	Int. 1/4 Rule VOLUME&UNIT			$VALUE/UNIT		TOTAL & VALUE	
SPRUCE/ FIR	74,337				/MBF		
HEMLOCK	2,374						
WHITE PINE	33						
NORTHERN WHITE CEDAR	599						
SUGAR MAPLE	20,979						
RED MAPLE	6,514						
YELLOW BIRCH	30,130						
WHITE BIRCH	7,959						
WHITE ASH	325						
BLACK CHERRY	32						
BEECH	123						
ASPEN	331						
TIE/PALLET HEMLOCK	25						
TIE/PALLET HARDWOOD	4,998						
SAWLOG TOTALS	148,758	MBF					
BOLTWOOD							
WHITE BIRCH	6,300				/MBF		
YELLOW BIRCH	8,914						
BLACK CHERRY	56						
SUGAR MAPLE	7,781						
	23,051	MBF					
SAWTIMBER/BOLTWOOD TOTALS							
CORDWOOD							
HARDWOODS	672,858	CDS			/CD		
HEMLOCK	13,315						
WHITE PINE	61						
SPRUCE-FIR	89,734						
CDWD. TOTALS	775,968	CDS					
GROWING STOCK							
HARDWOODS	50,584	CDS			/CD		
HEMLOCK	536						
WHITE PINE	713						
SPRUCE-FIR	32,497						
GROWING STOCK TOTALS	84,330						
GRAND TOTALS	171,810	MBF	&	860,298	CDS	.....	
AVG. COMM. ACRE	2.099	MBF	&	10.51	CDS	.....	
AVG.TOTAL ACRE	1.991	MBF	&	9.97	CDS	.....	

PART III – SILVICULTURAL PROGRAM

SUMMARY OF SIMULATIONS

Growth projections for each forest type were accomplished using FlexFiber and a silviculture and stand projection ***Simulate*** program developed by LandVest. FlexFiber is a peer reviewed growth and management program developed by foresters from the USDA Forest Service and The University of Maine at Orono, Cooperative Research Unit.

First FlexFiber was used to grow each forest type without any treatments for 20 years. Natural growth rates were obtained according to these FF simulations to serve as a baseline of how these ETC forest strata will develop over time. These growth rates were then utilized in the LandVest Simulator to be the same as the growth rates obtained from FlexFiber. This process is followed so that projections can be utilized that pass a universally accepted modeling process that has been peer reviewed for its predictability and accuracy. Internal rates of return for a variety of proposed silvicultural treatments were derived using our Simulator with the FlexFiber growth rates (See Appendix D Growth & Removal Simulations). The simulations with treatments were also conducted with FlexFiber and Simulate to insure an accurate comparison. Simulate is designed to also test a variety of different cutting strategies, such as cut to A-line, B-line, C-line, 90, 80, 60, 40, and 30 ft^2/ac. The goal being to determine the optimum silvicultural treatment that both address the maximization of IRR, while simultaneously designed to meet landowner and easement objectives. After obtaining growth rates from FlexFiber, internal rates of return were found using both the growth rate from FlexFiber and Simulate (see Table 2). This use of two simultaneous and somewhat different approaches provides ETC with a well conceived and defined means for determining with a higher level of certainty how the proposed silviculture will perform for each selected treatment and strata.

LandVest's primary modeling team is comprised of Steve Mongan EVP ACF LandVest and Dr. Haijin Shi Biometrician, with the on the ground input from Project Forester Richard G. Carbonetti ACF CF VP Timberland.

SUMMARY OF FINDINGS ON MODELING

1. The inventory results show that this resource is in the final stage of transition from a relatively even-aged forest cohort that has been in place for the past hundred years or so. It has been subjected to a series of partial cuts over the past few decades. The current remnant – particularly in the hardwood types, is in very poor condition, and generally incapable of producing viable stands of good quality hardwood sawtimber (*these remnant overstories are generally 40-60 square feet of basal area; with less than 50 trees per acre we could term Acceptable Growing Stock - AGS).* In many cases there is a viable understory of sapling to small poletimber stems, of good quality and fully capable of stocking the site to capacity – these are the stands future management will culture. A major recommendation is that the old remnant stands be removed quickly to enable this forest to meet the goals of the Conservation Easement.

2. As should be expected from a forest with this kind of profile, it doesn't matter much from a rate of return perspective what silviculture is accomplished. In most cases, not cutting at all produces a similar IRR to any cutting regimen or silviculture modeled. Prioritization of treatment follows two courses: The first is a method that takes the difference in IRR between best silviculture and not cutting as the rule for setting priority. The second method is to look at each stand-type to see which can least afford to wait (again from an IRR perspective) for treatment – in this case removal.

SUMMARY OF MODEL SIMULATION – TABLE 2

	Fiber		Simulator					IRR with Adjusted Growth Rate					
Stands	Natural Growth Rate (Cord/Acre/Year)	Management Growth Rate (Cord/Acre/Year)	Natural Growth Rate (Cord/Acre/Year)	Management Growth Rate (Cord/Acre/Year)	IRR with Natural Growth	IRR With manage-ment	Differ-ence	Adjusted Mgt Growth Rate	IRR with Fiber Natural Growth Rate	IRR with Adjusted Management Growth Rate	Treat-ment	Differ-ence	Prio-rity
H1B	0.512	0.512	0.207	0.207	5.86%	5.86%	0.00%	0.512	9.57%	9.57%	NT	0.00%	
H2B	0.470	0.470	0.414	0.414	7.60%	7.60%	0.00%	0.470	8.27%	8.27%	NT	0.00%	
H3B	0.606	0.668	0.469	0.336	5.16%	5.73%	0.57%	0.475	5.90%	6.21%	OSR	0.31%	3
H3B-H2B	0.607	0.641	0.466	0.404	5.67%	6.72%	1.05%	0.460	6.46%	7.17%	OSR	0.71%	3
H3C-H1B	0.663	0.347	0.416	0.217	6.18%	7.14%	0.96%	0.234	7.82%	7.34%	CLT	-0.48%	6
H4C-HS2B	0.461	0.598	0.428	0.402	4.86%	5.31%	0.45%	0.425	5.02%	5.46%	IT	0.44%	5
HS2-3A	0.419	0.419	0.643	0.643	7.30%	7.30%	0.00%	0.419	5.49%	5.49%	NT	0.00%	
HS3B	0.512	0.601	0.510	0.541	5.41%	5.89%	0.48%	0.543	5.56%	5.90%	IT	0.34%	5
HS3C-HS2C	0.456	0.231	0.438	0.207	5.32%	4.35%	-0.97%	0.210	5.45%	4.39%	CLT	-1.06%	2
HS34A-HS2B	0.459	0.594	0.497	0.527	4.98%	5.76%	0.78%	0.498	4.81%	5.60%	IT	0.79%	4
S1A	0.243	0.243	0.417	0.417	7.11%	7.11%	0.00%	0.243	3.10%	3.10%	NT	0.00%	
S2A	0.633	0.639	0.774	0.912	7.73%	8.52%	0.79%	0.832	6.67%	7.79%	OSR	1.12%	2
SH34A-SH2B	0.922	0.644	0.674	0.722	4.49%	5.58%	1.09%	0.859	5.33%	6.24%	OSR	0.91%	4
SH3C-SH2B	0.860	0.843	0.604	0.524	5.12%	5.62%	0.50%	0.629	6.60%	6.52%	OSR	-0.08%	
HS2A	0.456	0.456	0.559	0.559	5.95%	5.95%	0.00%	0.456	5.08%	5.08%	NT	0.00%	
SH34B-SH2B	0.849	0.728	0.688	0.758	4.55%	5.63%	1.08%	0.874	5.15%	6.16%	IT	1.01%	3
SH34C-S2B	0.621	0.573	0.656	0.639	6.58%	8.48%	1.90%	0.622	6.37%	8.35%	OSR	1.98%	1
	0.573	**0.542**	**0.521**	**0.496**	**5.87%**	**6.39%**	**0.51%**	**0.49**	**6.04%**	**6.39%**		**0.35%**	

* The negative IRR results from clearcut.

Note: the priority is based on both the tenth and thirteenth columns. In other words, the bigger the difference (the thirteenth column) and the lower the IRR with Fiber natural growth rate (the tenth column), the higher the priority.

Interpretation of each column in Table 2.

1. The first column is our stand name.
2. The second column is the natural growth rate from FlexFiber.
3. The third column is the growth rate obtained from FlexFiber with management treatments (e.g., regeneration cut).
4. The fourth column is the natural growth rate from our Simulate.
5. The fifth column is the growth rate obtained from our Simulate with management treatments.
6. The sixth column is the internal rate of return (IRR) obtained from our Simulate without any treatments.
7. The seventh column is the internal rate of return obtained from our Simulate with management treatments.
8. The eighth column is the difference between the seventh and sixth column.
9. The ninth column is the adjusted growth rate according to FlexFiber and our Simulate management growth rates (i.e., the third and fifth columns).
10. The tenth column is the internal rate of return obtained with the natural growth rate from FlexFiber.
11. The eleventh column is the internal rate of return obtained with the adjusted management growth rate (i.e., the tenth column).
12. The twelfth column is the recommended treatment in terms the internal rate of return obtained with the adjusted management growth rate (i.e., the tenth column).
13. The thirteenth column is the difference between the IRR with no treatment (i.e., the eleventh column) and the IRR with the best treatment (i.e., the twelfth column); therefore we know the estimation of management priority. In other words, we should first do treatments for those stands with large IRR difference.
14. The fourteenth column is the priority based on the tenth and thirteenth columns.
15. Treatment codes in the eighth and thirteenth column: NT – No Treatment; IT – Improvement Thinning; OSR – Overstory Removal; CLT – Clearcut.

TREATMENT BY SUPERSTRATA:

Hardwood- H Types:

The Hardwood stands on this tract were targeted by the previous owner to take advantage of markets and have left stands with varying conditions of quality, health and stocking. The long-term goal for the Hardwood forest type will be to improve overall quality and long-term value. Management on a stand level will vary depending on current conditions and previous treatments. As a result, some stands require no treatment other than time to appreciate in volume and value, while some stands will need to be rehabilitated or moved to regenerate due to issues of long term viability and value. There are also stands that are regenerated and well suited to shifting growth to a more promising younger component. Out of the +/- 48,319 acres of H types on the ETC ownership over 87% of the stands will be reviewed and potentially scheduled for treatments over the next 10-year management cycle. It is not envisioned that all this acreage will be scheduled in annual harvest plans, but this acreage is available for consideration due to priorities based on the resources silvicultural needs. In all likelihood treatments will occur on closer to 50-60% of the acreage in the next ten-year cycle.

Softwood- S Types:

The previous owner typically mined or regenerated Softwood stands and had left the softwood resource found in pure types in two conditions, either of a seedling sapling size class or of a poletimber size class. The S1A acreage should be left to grow, while the S2A will be looked at 5 years out for either thinnings if technology and markets allow or the removal of the poorer quality overstories where regeneration is well established. In many places adequate Spruce-fir regeneration has become established in the understory beneath a mature overstory. The removal of these overstories will allow for the growth potential of these sites to be better utilized. The primary approach in the S2A type will be to implement thinnings or harvests that capture declining stems and release crop trees or regeneration, or establish regeneration. Out of the +/- 4657 acres of S types on the ETC ownership over 78% of the stands will be reviewed and potentially scheduled for treatments over the next 10-year management cycle. It is not envisioned that all this acreage will be scheduled in annual harvest plans, but this acreage is available for consideration due to priorities based on the resources silvicultural needs. In all likelihood treatments will occur on closer to 50-60% of the acreage in the next ten-year cycle. As a reminder it is important to note that in total while there are only currently 4,658.8 acres of pure S types in the final 17 Strata in this plan there is an additional 2,231.2 acres of stands that were photo typed as S types (6 sub-strata in total) Once the data was processed these were moved into SH types due to their species composition. This demonstrates that there are certainly going to be additional type movements back into more Spruce-fir and Cedar dominated S types as forest management and natural succession moves ahead on ETC.

Hardwood Mixedwood- HS Types:

The hardwood dominated mixedwood types are found with a wide range of conditions that range from adequately stocked with and without regeneration to poorly stocked or recently cut at the end of the Champion ownership tenure. Many of these HS stands will in time naturally convert to SH types as the softwood that was harvested somewhat selectively by Champion will again capture the site as regeneration develops and fills the gaps in the current stand structure. Further, there will be a strong effort to remove declining retained hardwood from these types. That practice will also result in stronger stocking levels of Spruce-fir. These stands will be treated with the goal of maintaining maximum growth on residual sawtimber and pole-timber sized crop trees, and often to release a very well established and vigorous softwood seedling, sapling and small poletimber component. Treatments will depend on current conditions and stocking (especially regeneration)

and be administered on a shifting basis. The highest risk and declining stands will be targeted first with regeneration treatments such as OSR's and Shelterwoods. In well stocked stands with suitable health, treatments such as intermediate thinnings and crop tree release will be used to increase growth and maintain vigor of residual crop trees. Out of the +/- 19,700 acres of HS types on the ETC ownership over 91% of the stands will be reviewed and potentially scheduled for treatments over the next 10-year management cycle. It is not envisioned that all this acreage will be scheduled in annual harvest, but this acreage is available for consideration due to priorities based on the resources silvicultural needs. In all likelihood treatments will occur on closer to 50-60% of the acreage in the next ten-year cycle.

Softwood Mixedwood- SH Types:

The softwood dominated mixedwood types are found with a wide range of conditions that range from adequately stocked with and without regeneration to poorly stocked or recently cut again at the end of the Champion ownership tenure. Due to the age and condition of much of the retained Spruce-fir, especially the Balsam fir, there is a significant amount of at risk volume in the overstory of nearly all of the stands in this type group. Quite often stands found with an SH notation will develop even higher stocking levels of softwood as the selective removal of Spruce-fir from these types lowered softwood stocking, but simultaneously prepared the sites very well for the establishment and growth of Spruce-fir regeneration and some intolerants such as Aspen or White birch. Just as was the case in the HS type group as regeneration develops and fills the gaps in the current stand structure softwood will again become a major contributor to the volume present in this strata. As treatments are implemented declining hardwood and softwood will be targeted for removal. These stands will be treated with the goal of maintaining maximum growth on residual sawtimber and pole-timber sized crop trees, and often to release a very well established and vigorous softwood seedling, sapling and small poletimber components. Treatments will depend on current conditions and stocking (especially regeneration) and be administered on a shifting basis. The highest risk and declining stands will be targeted first with regeneration treatments OSR's and Shelterwoods. A variety of small group and patch cuts along Group Selection will be utilized to implement improvement thinning where appropriate. In well stocked stands with suitable health, intermediate treatments with the short-term goal of increasing the growth on residual crop trees will be implemented. Out of the +/- 9163 acres of SH types on the ETC ownership nearly 100% of the stands will be reviewed and potentially scheduled for treatments over the next 10 year management cycle. It is not envisioned that all this acreage will be scheduled in annual harvest plans, but this acreage is available for consideration due to priorities based on the resources silvicultural needs. In all likelihood treatments will occur on closer to 60-75% of the acreage in the next ten-year cycle.

TREATMENT BY STAND TYPE

Stand 1: H1B 1,521 acres

The BA (>=5") is 29.4 ft^2/ac and the number of trees <=4 per acre is about 210. There is only 5.2 cds/ac. Even if we treated it in the second 5 years, we still cannot gain anything due to the low current volume and the time required for these young and vigorous stems to develop a commercially viable stocking level.
Treatment: No treatment.

Stand 2: H2B (H2A and H2BC) 4,237 acres

Similar to H1B, the BA is quite low (28.4 ft^2/ac) and there are just 5.1 cds/ac in the overstory stocking. This strata's current overstory is not its future, but instead the sapling and seedling class on site or developing will be the managed stand in the future.
Treatment: No treatment.

Stand 3: H3A 16,237 acres

There are 804 trees per acre with total BA=89.2 ft^2/ac (75 ft^2/ac >=5"). The understory is almost established at about 630 trees <=4". Fewer than 50 trees per acre >=5" are AGS. Poor quality residual overstory. According to the simulation, improvement thinning is not feasible. This forest type covers 16,237 acres.
Treatment: Overstory removal reserving clusters of crop trees, but for some healthy stands, improvement thinning can also be considered. Operational cruises will determine implemented silviculture.

Stand 4: H3B/H2B 11,121 acres

This type appears to have a more developed understory than H3A with 857 stems per acre in <= 4 inch classes, but the simulation result is similar. The overstory is stocked at 70 ft^2/acre >=5 inches DBH, hence the B stocking level which has led to more light reaching the forest floor to provide for the development of a vigorous regeneration class.
Treatment: Overstory removal reserving clusters of crop trees, but for some healthy stands, improvement thinning can also be considered.

Stand 5: H3C/H1B 9,582 acres

There are about 627 trees <=4". The overall growing stock is 0.71 cds/ac. The current BA (>=5") is 55 ft^2/ac. The acceptable BA and number of trees (>=5") are 15.2 ft^2/ac and 34, respectively. Improvement thinning is neither feasible nor recommended. The understory is of such poor quality that overstory removal is also not a viable option.
Treatment: Clean silvicultural clearcut, covering two thirds of the area, done under non-frozen conditions to enhance scarification.

Stand 6: H4C/HS2B 5,625 acres

The overall BA is 98 ft^2/ac (81.4 ft^2/ac >=5"). The total number of trees is 750/acre, however there are 601 trees/acre <=4"; indicating this forest type was treated in the last 10 or 20 years with most likely regeneration cuts. This type is similar to other hardwood types in that it has a degraded overstory with only 30.4 ft^2/acre in AGS and a less than desirable understory. There is enough sawtimber in commercial

species to make thinning a viable option where individual stand conditions are suitably structured to provide sufficient residual AGS.
Treatment: improvement thinning is better than overstory removal for this forest type. The residual BA should be close to 64 ft^2/ac.

Stand 7: HS2-3A 631 acres

There are 2214 trees per acre for this forest type, however about 2053 trees are smaller than and equal to 4". The current BA is 47 ft^2/ac (>=5"). Improvement thinning is not feasible for the following ten years.
Treatment: Overstory removal to release the dense understory and to knock down some saplings and leave the stand less overstocked than it is currently found. OSR also produces the highest IRR.

Stand 8: HS3B 13,021 acres

The BA is 84.2 for trees >=5". The number of trees <=4" is 373 of a total of 606 trees. The growing stock is 1.12 cds/ac. Improvement thinning in the first 5 years is not feasible, because the harvest per acres is lower than a desirable minimal operational volume of 6 cds/acre removals.
Treatment: Improvement thinning in the second 5 years to remove poor quality trees and create space for the good quality trees and understory.

Stand 9: HS3C/HS2C 2,638 acres

The overall BA is 66.4 ft^2/ac (59 ft^2/ac >=5'). The growing stock is only 0.41 cords/acre (for trees >=4"). The number of trees <=4" is about 355 accounting for 73% of total number of trees. Acceptable BA is only 15 ft^2/ac (>=5') and the number of trees in AGS (>5") is less than 40. This is another poor quality stand. Improvement thinning is not feasible for the following ten years due to volume and quality limitations of less than 6 cds/ac. Silviculturally, a regeneration cut is a must, but there is not much gain to IRR.
Treatment: Clearcutting, leaving about one third of the stocking in clumps.

Stand 10: HS34A/HS2B 2,357 acres

This is a growing stand with growing stock found at 1.19 cds/ac (from 4" to 10"). The current BA >=5" is 92 ft^2/ac. The total number of trees is 616 with 420 trees <=4". The acceptable BA (>=5") is 38.4 ft^2/ac and the corresponding number of AGS trees is 80. Although this forest type is not a healthy one, there is enough sawtimber for a viable thinning option.
Treatment: Improvement thinning.

Stand 11: S1A 1,000 acres

The current BA is only 28 ft^2/ac. This forest type is not overstocked when analyzed in the trees 1" DBH and larger. But there is a very well established and dense seedling class in the <= 1" DBH stems. There are about 1568 trees per acre. This forest type can continue to grow until the average stem size can support a commercial thinning – some 15 to 20 years hence. There are also some specific stands or portions of stands that would benefit from PCT activities; the question is the economic viability of those procedures.
Treatment: No treatment within ten years.

Stand 12: S2A 3,660 acres

Overall, there are 2614 tees per acres for this forest type and trees <=4" is 2445. The growing stock is 1.38 cds/ac (from 4" to 10"). The number of AGS trees is 1070 (987 <5"). Commercial thinning is not feasible for the following ten years due to the limited total timber volume, but as this strata develops it will likely be very suitable for early thinnings with cut-to-length harvesting equipment.
Treatment: Overstory removal (w/ mechanical thinning) in the second 5 years, to release the understory.

Stand 13: SH34A/SH2B 1,223 acres

The overall BA is 158.8 ft^2/ac with 125.7 ft^2/ac >=5". The number of trees <=4" is 819. The growing stock is 2.8 cds/ac. The acceptable BA is 66.3 ft^2/ac (>=5") and the number of AGS trees is 210 (>=5"). The growing stock is 2.8 cds/ac. Comparatively, this is a good forest type with reasonable stocking. Model simulation indicates that overstory removal can achieve the highest IRR. But the difference between improvement thinning and overstory removal is small.
Treatment: As the objective of this plan is to grow large, high quality sawtimber, we overrode the simulation recommendation and will use improvement thinning.

Stand 14: SH3C/SH2B 1,009 acres

BA=60 ft^2/ac (>=5'). The total number of trees is 1196 per acre (986 trees <=4'). The acceptable BA and AGS trees (>=5') are 32 ft^2/ac and 108/acre respectively. It is infeasible to do improvement thinning for the following ten years. The overstory is a thinly stocked residual, but there is a very viable and generally well established advanced regeneration and sapling class developed on site.
Treatment: Overstory removal designed to capture at risk value and release a very viable understory.

Stand 15: HS2A 852 acres

This forest type was likely treated in the past 10 or 20 years. The current number of trees <=4" is 913 (721 are AGS), which accounts for 79% of the total number of trees in these sub-merchantable classes. Improvement thinning is infeasible and IRR from overstory removal is less than no treatment. Therefore time is required for a manageable stand to develop at some point outside of the planning cycle of this management plan.
Treatment: No treatment.

Stand 16: SH34B/SH2B 5,837 acres

BA=111 ft^2/ac (>=5"). The diameter distribution is a typical reverse "J" shape. The number of trees <=4" is 698 of the total 1025. The acceptable BA and trees >=5" are 55.1 ft^2/ac and 177 respectively. The number of AGS trees <5" is 184. Improvement thinning and overstory removal can achieve similar IRR.
Treatment: In order to grow large sawtimber, we chose improvement thinning rather than overstory removal. This approach serves the goals of ETC and an objective of the CE over the long term.

Stand 17: SH34C/S2B 1,095 acres

The total number of trees is 1349 (1141 trees are less than or equal to 4"). The current BA (>=5") is 65 ft^2/ac. The acceptable BA is only 16 ft^2/ac. The overall number of AGS trees is 319. Due to the limited timber volume, it is infeasible to do improvement thinning for the following 10 years. The IRR from overstory removal is much higher than that from no treatment (8.55% vs. 6.44%).
Treatment: Overstory removal to harvest most of the large trees and release the understory.

SILVICULTURE - GENERAL

These forests have the capability to grow all of the commercially viable species found in this Northeast Highland ecotype, both in even-aged and uneven-aged systems. However, as is often the case with industrial timberland in the northeast, most of ETC's current stand structure and composition are incapable of economically supporting true uneven-aged management practices. There is neither the age and size class distribution present, nor a sufficient level of acceptable growing stock available to provide for a suitable overstory that can sustain the light and frequent harvests required in an uneven-aged system. Secondly, the structure does not contain three distinct and viable age classes on most acres. There are often two age classes present, but in many of those stands, the older overstory is in decline or comprised of an insufficient stocking of AGS to allow for it to be carried forward while a third age class is developed. To address these issues, this plan calls for a harvest level of between 30, 000 and 40,000 cords covering about 3,500 acres per year, over the 10 year period.

The forest management activities recommended here are designed to achieve the owner's financial objectives within the constraints of the terms of the Conservation Easement, FSC certification, the Vermont Use Value Appraisal Program and State timber harvesting regulations.

Activities to enhance the forest's function as wildlife habitat and as a biologically diverse resource are built into the silvicultural actions outlined in the plan. As an adjunct to these non-consumptive uses, forest management actions will achieve a competitive rate of return on invested capital by building long-term value and generating periodic cash flows. Timber sale revenues provide cash for reinvestment in the property, and cover costs of management, such as road maintenance, taxes and insurance. Short-term income will be balanced with the cost of very high quality forest management work. Harvesting contractors will be properly compensated to achieve the goals of ownership.

At present there is a substantial resource available for harvest. With this land capable of producing 0.515 gross cords per acre, (based on fall 2006 growth modeling) this ownership can sustain an allowable harvest of +/- 40,000 cord equivalents/year. While many acres should simply be left to grow, there are many acres in need of pro-active management. These areas in need tend to be the hardwood stand types where excessive harvest levels and high grading has resulted in stands that are stocked with poor levels of AGS and are often found with a declining overstory over a more vigorous and potentially valuable second age class in the understory.

Ideally, harvest levels at the beginning of the management period would be between 30,000 and 40,000 cords annually. This harvest level is needed to capture the declining volume and value in the prioritized types. It is likely, however, that a two or three year ramp-up will be required. It will be necessary to expand forestry and harvesting capacity, and ETC will only do so at a rate that maintains the highest quality standards.

At the end of the10 year management period, as the priority types and stands are stabilized, harvest levels will decline to equal or less than growth. The ownership will then enter a period where regenerated and released understory stands will require a period of growth. Eventually, fully stocked stands will be more commonplace and management will move into a more typical pattern of thinnings and regeneration. It will be at this time that issues regarding age class distribution can be addressed.

HARVEST STRATEGIES

General Age Class Silvicultural Strategies

Regeneration techniques will utilize both even-aged and uneven-aged management systems. Although the use of true selection systems will be extremely limited due to the lack of uneven-aged stand structure at this time. Even-aged management or some variation of multi-aged management will dominate the Essex Timber's silviculture. True uneven-aged management will be used less often since the existing timber resource is largely even-aged, or at best two-aged. Conversion of even-aged to true uneven-aged management can be difficult and impractical. A more appropriate variation of the uneven-aged system is the use of patch cuttings and group selections that result in a mosaic of different age classes across the landscape.

Partial cuts, justification

Where the current overstory has a sufficient level of AGS and is stocked at levels justifying or requiring thinnings partial cut practices will be implemented. These are comprised of both intermediate thinnings in immature stands and regeneration techniques in mature stands. Most thinnings in this forest will be release of selected crop trees via crown thinning – often in clusters (or thinning from the outside). The objective in those thinnings is to maximize stand value growth by selecting trees most capable of rapid accretion of value and thinning around those trees. The justification for thinning is these silvicultural activities will add to the internal rate of return on invested capital, as well as meet the goals of the owner and the CE to develop stands of broader size and age diversity.

Where stand quality and health allow regeneration treatments will also be implemented with partial cutting. ETC inherited a number of stands which have already undergone what have often mimicked the first of either two or three stage Shelterwood cuts, and the intent is to finish the job. More often, our regeneration methodology will be regular or irregular patch cuts. This is done because the objective will be to regenerate species that require both exposure of mineral soil and abundant sunlight – Yellow birch in SH and HS types and Spruce-fir in S and SH types are prime examples. While the regeneration of Yellow birch on the short-term may be in conflict with the stated goal to enhance the stocking levels of Sugar maple it represents the short-term reality of using management techniques that suit the current condition of the resource. As time passes and more fully stocked stands, even of Yellow birch develop, the opportunities to enhance the establishment and growth of the more shade tolerant Sugar maple will occur and be reflected in the modification of silvicultural practices implemented down the road.

Canopy removal, justification

a. Regeneration

Regeneration harvests will be used under two primary conditions. Condition one is where there is adequate advanced regeneration that is ready for release and overtopped by poor quality overstory, the goal will be to remove the overstory and release the advanced regeneration. Condition two is where stands have not adequately regenerated and the overstory is not growing at satisfactory rates, is in decline, or stocked with an unsuitable level of AGS. The goal in these conditions will be to complete a seed tree, Overstory removal, Shelterwood, or Silvicultural Clear-cut regeneration harvest strategy.

b. Rehabilitation

Generally these harvests will be targeted at stands that have been high graded with a residual of suppressed and poor quality stems. The goal will be to remove the poor quality overstory and create conditions to regenerate and or release an existing and higher quality understory. This form of regeneration (release) harvest will be very common on the lands of ETC in that there are many acres of

poorly stocked and high-graded overstories that are currently not contributing to the growth of the forest either in quality or quantity, yet there are previously established understories of very viable sapling and very small poletimber. These treatments are less of a true regeneration action then the implementation of the removal of a declining overstory that is competing in such a manner that a very viable established understory would be well served by the release or stand rehabilitation.

c. Salvage/Sanitation

In case of natural events causing significant damage to the crowns of trees, or other damage causes from insects or disease, salvage operations will be utilized to remove affected trees that have little or no chance to survive. Sanitation harvests will be completed to stop or reduce spread of insects or disease where appropriate. A further use of salvage operations will be the capture of declining overstories or recent mortality brought about as a result of past poor quality forest operations.

The preferred harvest equipment for ETC timber harvests is mechanical operations using feller bunchers that have the ability to "reach" into areas and pre-bunch hitches in identified skid trails. Grapple skidders can then be utilized to forward the hitches of trees to the landing. In this manner, skidders can refrain from operating in areas other than the primary and secondary skid trails.

With the advent of other technological advances such as Cut-To-Length fellers in conjunction with Forwarders, even more careful operational activities can be implemented with reduced damage to the soil and residual stands. This equipment, if deployed properly, can extend harvesting season without damaging the site. This will allow for a better economic profile for the contractor force and provide a more even product flow for local mills.

Conventional harvesting (use of chain saw operators and cable skidders) will also be utilized. This equipment is often the most suitable and safe for the most difficult and rough terrain. Operators "pulling" cable in sensitive areas where skidders and other equipment should not operate can mitigate ground disturbance issues. On steep slopes or where uphill skids are required due to the lack of suitable road access, cable crews are often the most cost effective and environmentally efficient equipment. Where small operational units are selected, the use of small cable skidders on small landings may be the most economical choice.

Overview of Recommended Silvicultural Systems

This Forest Management Plan demonstrates that the management of timberland should be driven by the implementation of the most cost effective and environmentally appropriate silviculture. What this means in practice is that from the inventory, to the modeling, to the strata based management goals it is imperative that the managers of a landscape scale resource have many options available to provide for a dynamic and sustainable forest management program. The development of these recommendations was made with the full understanding that there are three oversight components to the planning and implementation process: 1) The Conservation Easement, 2) Use Value Appraisal Requirements, and 3) FSC standards. Having recognized that these three levels of oversight provide for the potential removal of some options, the plan's diverse recommendations meet both the spirit and terms of all three levels of oversight. The plan consistently returns to the goals of the easement and the owner, to manage the forest resources of ETC as an ecologically and economically sustainable working forest.

What follows is a presentation of a broad range of silvicultural options that form the menu from which this plan draws its recommendations for each of the 17 strata selected from the original 29 forest types inventoried on ETC. It is important to consider that for each strata there may be several options to achieve the desired overall planning goals for that strata.

Regeneration Options:

Group Selection or Small Group Cuts: (uneven-aged, UVA code 8) The culture of multi-aged stands comprised of small even-aged pockets is an effective means of managing many of the stand-types found on the ETC ownership. To properly utilize this method the groups will be in a string of small openings connected by skid trails resulting in what is commonly referred to as a chain of pearls.

The goals of this treatment option are:

- to limit impact on the residual stand
- maintain a more irregular stand structure
- establish regeneration in the openings
- Allow for the targeted removal of UGS and the retention of AGS clusters

Implemented Silviculture will:

- remove no more than 1/3 of the basal area from the entire stand in any one entry
- avoid fixed strip layouts so the most mature or at risk timber can be selected and the best growing stock avoided.
- utilize the most appropriate mechanical or traditional cutting methods
- Group sizing will be driven by the stocking level and size of the advanced regeneration present and will vary from as few as 4 or 5 stems to as large as 2 acres.
- The size and structure of these groups and patches will be determined prior to harvest.

Combined Group and Individual Tree Treatments: (uneven-aged, UVA code 8) For an option where there is a suitable level of currently available growing stock, yet selected stands require improvement thinning or the first levels of regeneration work a combination of small groups and the selection of individual trees will be a very effective means of managing these types. These treatments are only suitable where the current overstory is of acceptable quality and vigor to be considered suitable for carrying forward for at least one or two thinning intervals or cutting cycles. The stands typically to be treated with this regime will have not been recently harvested by Champion, often on better sites, and with over 50% AGS in co-dominant and dominant stems.

The goals of this treatment option are:

- improve and/or retain AGS whenever possible
- limit removals to effect improvement thinnings or partial regeneration entries
- retain sawtimber and poletimber crop trees and overall stand value
- capture at risk value, even in relatively small volumes as an adjunct to the stand improvement

Implemented Silviculture will:

- treat stands with small group cuts on a hitch or multiple hitch sized openings (+/-6-25 trees).
- remove individual high value or volume stems adjacent to those openings that are deemed appropriate for removal,
- release growing stock,
- reduce residual stand damage
- create multi-aged stands that build stand value while meeting aesthetic concerns
- cluster thinning is often applied to this regime.

Individual Tree Selection: (uneven-aged, UVA code 7) In this instance we are recommending true uneven-aged practices, but guided by the principle that soils and other factors on the lands of ETC favor group removals and retention of groups to minimize windthrow and logging damage. There will be hardwood sites that once stocked with acceptable levels of AGS that will be capable of true single tree selection, but the current forest on the whole has very few acres that meet the silvical characteristics to support and prosper under uneven-aged treatments of this sort.

Strip and Patch Cuts: (even-aged, UVA code 6) In very uniform stands in need of regeneration or in areas where salvage is the objective the use of large patch cuts or uniform strips will be the option of choice. With many of these sites being readily regenerated to softwood and often having strong Spruce-fir understories, or poor quality hardwood stands without adequate available regeneration, the removal of the overstory utilizing larger openings would be appropriate.

The goals of this treatment option are:

- capture of declining overstory value
- release of suitable advanced regeneration
- use in more uniform stand types where a more mechanical layout will work efficiently
- provide true silvicultural clear cut options where appropriate to provide enhanced regeneration conditions

Implemented Silviculture will:

- utilize mechanical harvest methods
- cuts will not exceed 15-25 acres with appropriate residual retention buffers except for salvage harvests are allowed, with notification and justification by the CE.
- where the presence of acceptable levels of advanced regeneration is present and is documented openings may exceed the 25 acre limit
- Openings can exceed 25 acres when utilized for future salvage opportunities as allowed by the CE.

Patch or Group Regeneration Cuts: (even-aged, UVA code 5) These cuts will vary from Release cuts in that there will not be adequate advanced regeneration or a suitable understory present for release. Pre-harvest inspections and inventory will be required to ascertain whether these entries are of a release or regeneration establishment nature. Obviously due to UVA and CE requirements those individual stands where established regeneration is lacking will require smaller openings and retained residual buffers to divide the patches into separate 25 acre blocks.

The goals of this treatment option are:

- regeneration establishment through the removal of unacceptable and/or maturing overstories,
- create openings and disturb the site to favor the development of a new seedling class

Implemented Silviculture will:

- remove 25 to 50 percent of the basal area in clearly defined, though not necessarily regular shaped patches
- use the option of broader harvest levels where overstory conditions dictate.
- seed tree entries would also fall into this category, especially where Yellow birch is available and a desirable regeneration species due to present site conditions.

Light Two-stage Shelterwoods: (even-aged, UVA code 3) As the retention of suitable overstories is an overreaching goal of ETC and the CE as one moves this forest forward to a more

sustainable and productive structure lighter partial entries both in regeneration avenues and thinning entries will be favored. Where there is a poor overstory, or one with a limited sawtimber component that can be carried for 10 to 15 years the initiation of two stage Shelterwoods will be an effective means of regeneration. The justification for two stage versus three is that these sites are often too shallow or favor softwood sufficiently that attempting three cuts on a short cycle would be ineffective due to site limitations and potential losses to blow-down. In other instances regeneration treatments may have earlier mimicked the first stage of a three-stage Shelterwood and the current owner is simply implementing cuts two and three. These stands simply are often found as post Champion thinnings that were too aggressive and have left a poorer quality overstory with insufficient basal area and volume to enter the stands in a three cut cycle. In essence the CIC entry was the first, but unplanned stage of a three stage Shelterwood.

The goals of this treatment option are:

- provide for partial removals in a regeneration scenario
- release advanced regeneration established from previous entries that have mimicked 1st and/or 2nd stages of Shelterwood systems.
- retention of short term value, the majority of the sawtimber stems of suitable vigor that can be carried forward 5-15 years
- capture through partial entries limited volumes of declining and at risk stems

Implemented Silviculture will:

- utilize classic Shelterwood strategies and techniques
- be generally implemented with mechanical harvesting techniques
- retain +/- 40 to 70 ft^2/acre depending on the initial basal stocking level
- will often favor Yellow birch and Spruce due to the site and soil conditions found in the stands where 2 stage entries will be the selected practice

Release Cuts:

Overstory Removal: (even-aged, UVA code 4) This silvicultural option will be quite common on the lands of ETC as many acres are found with two-aged stands where the older and partially overtopping age class is often in poor condition and in many instances losing volume and value to decline and subsequent mortality. Further, these older age classes are often completely lacking in a suitable level of AGS to warrant carrying them for a longer period in the rotation for the strata.
These release cuts will utilize either partial or complete Overstory Removal harvests utilizing:

1. smaller patch or group cut/selection techniques,
2. true complete OSR treatments that will remove overtopping canopies from advanced seedling, sapling or poletimber understories,
3. larger partial patch cut removals, but not complete OSR's, that will target openings that do not exceed the 25 acre CE limit where regeneration is targeted for enhancement, or the irregular nature of stocking demands the retention of suitable pockets of younger and more vigorous overstory components.
4. large overstory removals in areas where regeneration is well established, while retaining adequate retention for wildlife habitat and sensitive areas including seeps and stream buffers.

The goals of this treatment option are:

- capture at risk or declining overstories
- release from overtopping competition advanced commercial regeneration, saplings or poletimber
- increase the percentage of AGS present on any treated acre

Implemented Silviculture will:

- retain AGS growing stock whenever possible
- target canopies where there is insufficient stocking in basal area or AGS to sustain the stand moving forward
- remove overtopping unacceptable growing stock and financially mature stems to release existing advanced seedlings and saplings.
- cuts will vary from under one acre to 25 acres in size, but in some regenerated stands could exceed the 25-acre limit and treat much larger acreages.
- Most often utilize mechanical harvest methods to successfully implement these treatments

Intermediate Treatment Options:

Overall the analysis of the timberland of ETC finds that there are opportunities later in the cycle of this plan to prioritize entries of an intermediate nature. While the plan clearly demonstrates that the initial 5-year period of the plan stands to be targeted for action will be comprised almost exclusively for regeneration treatments of all kinds. The forest resource of ETC was aggressively harvested for a 10 year period from 1984 to 1995 leaving many heavily cut stands that are ready for regeneration efforts to be initiated or completed. Simultaneously, the opportunities for intermediate entries are very limited. There are two major considerations for this and they both have ecological as well as economic considerations. The ecological is that ETC and the easement have the objective to develop a more valuable forest that is structured to produce larger diameter sawtimber quality trees. Secondly, the desire to have this forest perform in a sound economic fashion dictates that the required cash flow be generated where harvests and thinnings not only address short-term cash flow targets, but have the most impact on the overall IRR of the investment. To accomplish that, regeneration harvests will target the stands where dollars are being lost on the short term to decline and mortality, and over the long term to increase growth rates on AGS quality stems. In those stands where we find suitable AGS stocking, the overall stocking rarely requires entry early in this planning cycle in that the best stands from a quality and growth standpoint are either young, in the 5-30 years age and 1-10 inch DBH classes, or if of an older age and larger size profile at less than full stocking and in a position to continue to grow rapidly.

Therefore while we are presenting a full range of intermediate treatments, their implementation will be, for the most part, found later in the planning cycle, or waiting for implementation once the younger stands reach a full stocking level 15-25 years out.

Improvement Thinnings: (even-aged, UVA code 2) In those stands in the strata where current stocking levels are represented by a sufficient basal area of acceptable growing stock and that are at or near the A-line on the appropriate stocking guide partial cuts in the form of improvement thinnings would be very appropriate.

The goals of this treatment option are:

- release of targeted crop trees
- improvement of the percentage of AGS in the residual stand
- thinning to B-level stocking based on the appropriate silvicultural guide
- limited site disturbance and residual stand damage

Implemented Silviculture will:

- cluster thinnings would be the preferred on-the-ground methodology
- concentrate removals so as to limit the impact on the residual stand and soils.
- release of stems of crop tree quality of Sugar maple, Red maple, White Ash, Yellow and White birch in the hardwood and Spruce first, then Balsam fir in the softwood
- to retain as a goal in all the minor species such as Beech, Basswood, Black Cherry, Mountain ash, White pine and Northern White cedar to insure diversity and a healthy ecosystem.
- residual stand stocking recommendations are 75 to 110 square feet in the mixed wood components, 60 to 70 square feet in the hardwood areas, and 70 to 150 in the softwood types

Group and Small Patch Thinnings: (even-aged, UVA code 2) The use of these treatments in stands slated for even-aged treatments will be dictated by stand structure relating to the entries implemented by Champion and the dynamic stand structures related to these entries. Quite often the previous entries, especially in S and HS/SH strata served to create a mosaic on the ground of even-aged groups of various sizes in stands with generally two age classes present, but at times three. In those stands where for a variety of reasons the stand structure is either patchy due to age differences or due to a grouping of AGS adjacent to groups of UGS the use of relatively small even-aged group removals will be an option for thinning stands approaching the A-line. In other words one will not create stands initially with three or more distinct age classes, but instead be leaving a stand that either has two distinct age classes and after a second entry will be moving into the realm of a reasonable uneven-aged stand structure of soft or mixed wood.

The goals of this treatment option are:

- light entries in stands more suitable for multi-aged stand development
- target stands that due to past entries are found well stocked, but with size and or age class diversity due to a patchy stand structure
- provide for combined thinnings for improvement entries, yet with the potential to either establish required regeneration or release where present existing regeneration.

Implemented Silviculture will:

- target low quality stems that are impeding the growth of pockets of AGS
- create or favor the existence of irregular stand stocking by size and age class distribution
- retain +/- 2/3 of the stand area in relatively undisturbed pockets.

Pre-commercial Options:

As there is a long way to adjust the structure of the ETC lands to achieve the owner's and the CE goals of a sustainably managed working forest there may be value in using pre-commercial treatments. Acreage with high levels of competing vegetation or excessive levels of moose browsing could benefit from the planting of softwoods, in particular spruces, as a time effective means for getting forest stands re-established. In all instances these out of pocket investments must be weighed against the economic returns associated with the results. But there way be a means for carrying out these sustainability treatments in the future with the help of Federal or State cost share monies. At present there are few funds available, and more importantly these actions need to stand on their own if the property is to be profitable and sustainable. There are currently Federal tax deductions and credits that can help to offset tree planting and other pre-commercial treatments, but unless there are overall economic gains to be made by these activities they are presented as options, but not as scheduled treatments.

Pre-commercial Thinnings (PCT) – (UVA code 1) This practice has proven to be very effective in accelerating rapid, early growth in young softwood and mixed wood stands, but the economics of it is in doubt for non vertically integrated managers. Densities are reduced from highs of 10-15,000 stems per acre to optimal stocking of 900-1500 trees per acre.

The goals of this treatment option are:

- reduce competition for released crop trees
- alter species composition to favor spruce

Implemented Silviculture will:

- select crop trees based on a series of decisions
  - starting with species (Spruce is #1)
  - crown position (Select a stem already expressing some dominance),
  - stem quality (straight and free of defects),
  - finally a spacing goal of +/- 10 feet by 10 feet.

The acreage regenerated by Champion from 1990-2000 presents an abundant source of potential pre-commercial thinning opportunities. The previous owner conducted a limited program during the early 1990's. Sites for these treatments must be carefully selected so that the investment is only made on higher quality softwood sites, those with better drainage, and in individual stands that contain a sufficient stocking of Red and/or Black Spruce so that the investment in PCT will not be browsed away either by moose or deer. PCT can drop 20-30% off the rotation length of softwood and bring on line the first commercial thinning much earlier in the rotation. Further, gains are made through the reduction of early stand stress and that often precludes or greatly delays the onset of a variety of pathogens that can rob softwood stands of significant volume and value at rotation age.

Timber Stand Improvement (TSI) – (UVA code 1) These treatments vary from PCT in that they are generally implemented in large sapling to small poletimber hardwood. These operations look to release +/- 100-200 potential crop trees per acre. The TSI contractor selects target crop trees in a similar fashion to PCT but instead of getting a 4 side release a minimum of two and ideally three side release is the goal. These TSI operations can and have been in the past tied to manual removal of firewood. It is possible that with the recent upsurge in firewood demand the opportunity for thinning firewood blocks may again come back into fashion and make these efforts economically feasible.

The goals of this treatment option are:

- reduce competition for released crop trees
- alter species composition to favor the most valuable crop tree species for the site, generally Hard maple and Yellow birch for hardwood sites and Spruce and White pine for softwood sites

Implemented Silviculture will:

- select crop trees based on a series of decisions
  - starting with species (Site specific)
  - crown position (Select a stem already expressing some dominance),
  - stem quality (straight and free of defects),
  - finally a spacing goal of +/- diameter in inches (represented as feet) plus 10 feet as the average distance between selected crop trees
  - Try to maintain a net of +/- 100-200 crop trees, regardless of pure spacing goals so as to have sufficient crop trees moving forward.
  - Retain sufficient residual stocking to avoid epicormic branching in hardwood crop trees.

Herbicide Treatments- Due to Vermont Law it is not possible to use aerial applications of herbicides on the lands of Essex Timber, but the state and the CE allow herbicides to be utilized with ground application. Herbicides for a relatively low cost per acre can be a remarkably effective means for removing competing vegetation so that established regeneration can get a quick release and remain much more vigorous and healthy. In other areas the removal of hobblebush, raspberries, Beech brush and other deterrents to the establishment and growth of commercially viable stems can be cost effectively accomplished with herbicides. Due to the negative impacts on the structure and species composition of the understory on many acres by moose browsing there may be no alternative to herbicides to prepare sites to again establish and develop viable understories. Further consideration over time will be required as to the potential and very real development of invasive species epidemics. The control of invasives may also require the use of herbicides as the management of ETC moves forward. At present the role of invasives is a minor, but growing concern in the Northeast Kingdom region of Vermont. Elsewhere, especially in the region of the four southern counties there is widespread forest damage due to introduced species. In those areas herbicides have been found to be the only effective means of control and/or where possible elimination of these destructive plants.

Planting- Planting is clearly not a broad landscape solution, but in the proper locations (good sites) and if addressing a multitude of issues such as timber production in conjunction with wildlife habitat enhancement, Champion demonstrated in its last decade that the planting of spruces on upland mixed wood sites was an effective means of regenerating sites and offsetting regeneration concerns, the replacement of volume lost to buffers and reduced harvesting in riparian zones, and finally a means for simply getting acres back in production.

HARVEST PLANNING

Harvest Scheduling

The Use Value Appraisal Program (UVA) guidelines and the Conservation Easement holder's planning process dictate that a timber harvest plan be developed. With thoughtful planning all strata and the stands comprising the strata will be planned in advanced on a broad level projecting out ten-years. But it is imperative on a tract of this size and diversity that the managers of ETC are provided sufficient flexibility on a unit-by-unit basis to achieve silvicultural, ecological and economic goals. The stands have been prioritized through modeling and in most instances there will be a priority treatment selected. It is important to consider that for each strata there may be several options to achieve the desired overall planning goals for that strata. In order to maintain operational efficiencies, targeted areas may include stands in a relatively healthy condition based on location and harvest timing. Under these circumstances, the appropriate silvicultural prescriptions will be used based on stand conditions.

For each year of the timber harvest plan, managers will evaluate the individual stands available for treatment through an established protocol for evaluating forest conditions on a stand-by-stand basis. The protocol involves a pre-harvest assessment or cruise that determines the specific nature and conditions of the stands in the unit. Then utilizing those treatments from the silvicultural menu for those strata to meet the goals of the modeling, a timber harvest plan (THP) will be developed on a stand specific basis. (See Appendix D) THP's include provisions for sensitive areas, wildlife habitat, and other non-timber considerations, and are accompanied by operational maps.

In addition to considering site specific ecological values through the THP process, ETC managers also consider landscape level ecological values by distributing harvests to influence age class distribution and species composition. Managers review a number of GIS databases maintained by managers and others (Appendix E) to see what natural influences occurred on the proposed harvest areas, and how harvest operations may influence the larger landscape. Things such as natural heritage sites, the distribution of representative late successional inclusions, wildlife habitat, the application of whole tree harvesting in relation to elevation and site productivity, harvesting practices by adjoining landowners, recreational impacts, and aesthetic impacts are among those things considered during the planning process.

Individual timber harvest plans and their associated documents are then presented to the easement holder for review for compliance with the CE and the approved Forest Management Plan. In instances where treatments vary greatly from the original prescription, both the easement holder and the County Forester must approve an amendment to satisfy the requirements of the CE and the UVA program. THP's are also utilized for regulatory purposes, such as Act 250 applications for harvests occurring above 2500 ft. in elevation.

Harvest Timing

15-20 Year Harvest Cycle –

The management contemplated for the Essex forest is a blend of even and uneven-aged regeneration systems and intermediate treatments. Please note as addressed earlier the use of uneven-aged practices is well into the future due to the age, vigor and quality of the composition of much of ETC. Management decisions at the stand level are based on stand conditions. Some stands will be completely regenerated at the time of harvest whereas a strong component of some form of improvement cutting is a firm recommendation of LandVest. For planning purposes, a 15-20 year harvest cycle will be used to schedule intermediate treatments; with 5-15 years typically utilized for multiple entry regeneration harvests

based on the type of regeneration treatment selected. Managers will maintain a flexible planning regimen that permits rapid response to changing conditions.

Residual Stand Objectives

When even-aged or two-aged management (e.g. seed tree, regular or irregular Shelterwood), or deferment cuttings is employed, live trees and native vegetation are retained and opening sizes are created within the harvest unit in a proportion and configuration that is consistent with the characteristic natural disturbance regime in each community type, unless retention at a lower level is necessary for restoration or rehabilitation purposes. Even-aged silviculture is used only where harvest units can include riparian and streamside buffers and other special zones. In addition, desirable overstory and understory species may be retained outside of buffers or special zones while allowing for regeneration of shade-intolerant and intermediate species consistent with overall management principals. Where stands have been degraded, less retention can be used to improve both merchantable and non-merchantable attributes. Even-aged practices will dominate the management of ETC on the short-term due to the current age and quality structure of the forest resource. These treatments will be utilized to capture decline, establish more AGS, and move these stands to a more fully stocked condition whereby then uneven-aged practices can have more success in bringing positive changes to the forest resource of ETC.

When uneven age silvicultural techniques are used, (e.g., individual tree selection or group selection), canopy openings are less than 2.5 acres. If used properly, uneven age silviculture is employed to prevent high-grading and/or diameter limit cutting. The use of this system is predicated on the development of stands with sufficient AGS to manipulate moving forward so as to allow for the longer rotations and development of higher quality stands that is a goal of ETC and the conservation easement.

Species to regenerate are selected based on site capability and presence of advanced regeneration, after consideration of long-term timber/wildlife values and biological and economic risks.

In light of the desire to retain native species and islands of vegetation for the reoccupation of native species, both macro (trees) and micro (other vegetation) the following Figures outline some options available where clear-cutting and overstory removals are implemented.

The Following Four figures are illustrations of ways to maintain 20 BA retention in a clearcut.

Figure 1: Scattered Retention

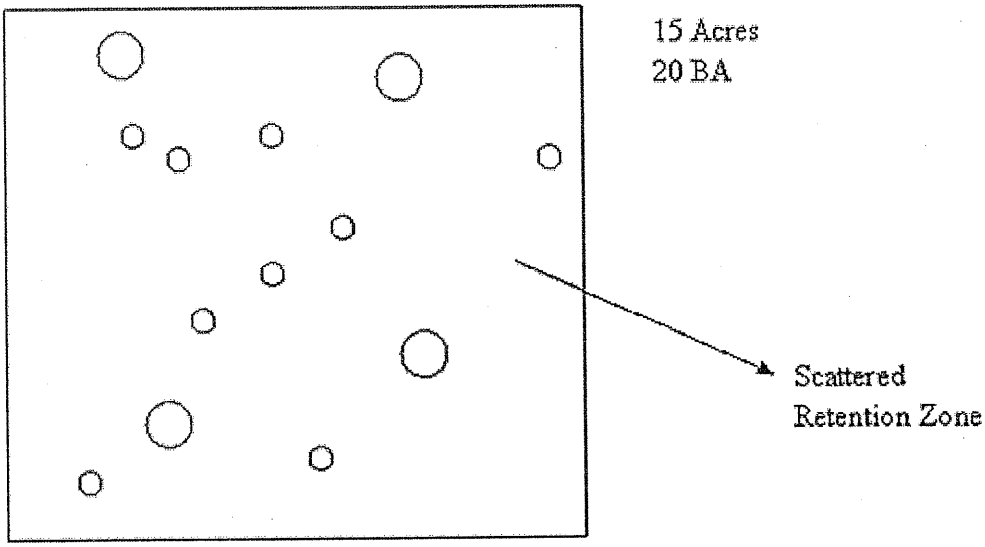


Figure 2: Corridors Retention

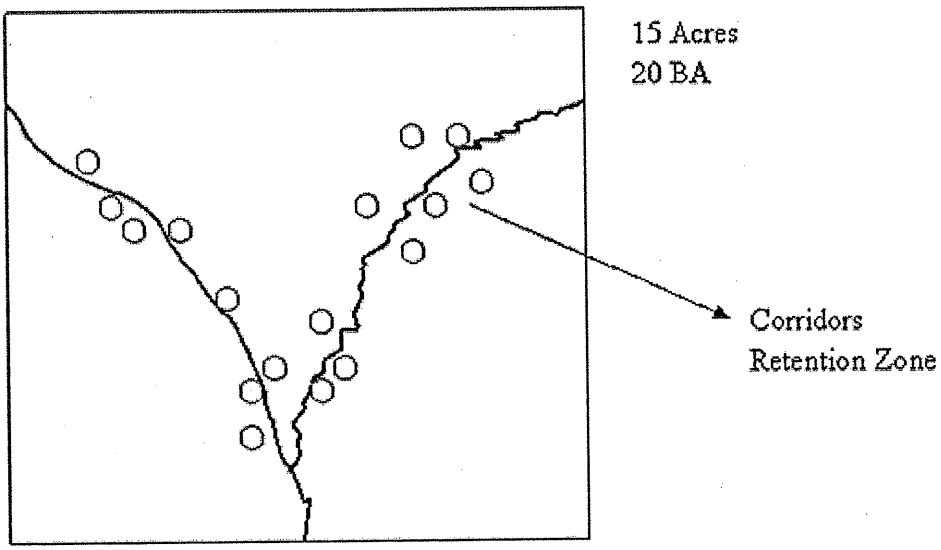


Figure 3: Clumped Retention

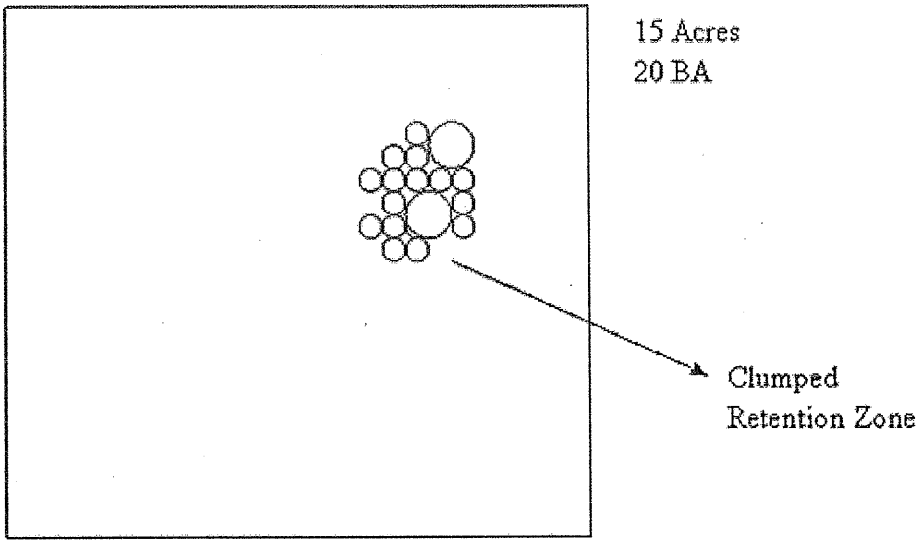
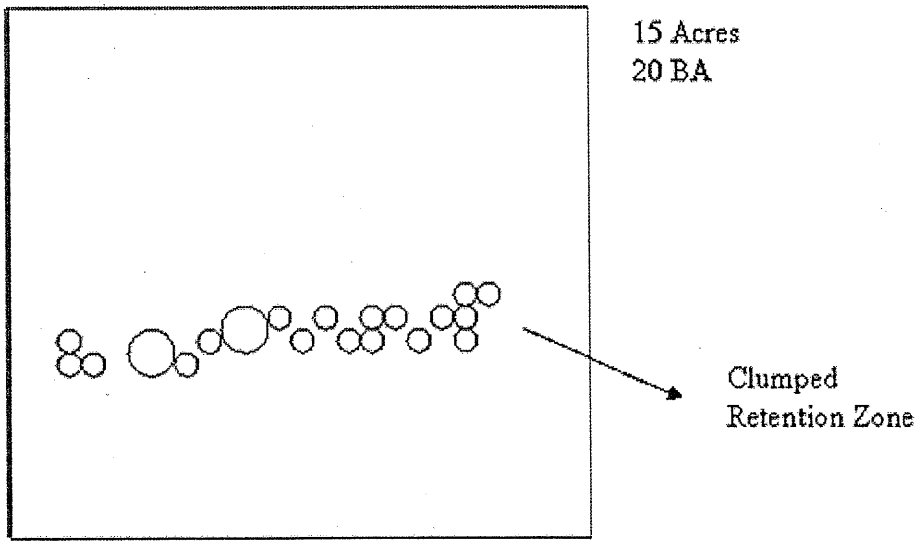


Figure 4: Clumped Retention



Coarse Woody Debris

General Discussion and Background:

Generally, coarse woody debris (CWD) is defined as the portion of a tree that has fallen or been cut and left in the woods. More specifically, it is defined as a material greater than 8-10 cm (4 inches) in diameter, "the larger dead and mostly down woody material which is in various stages of decomposition. It includes pieces >7.5 cm and overturned stumps <1.3 m with attached roots, or >1.3m without roots. It excludes self-supporting, dead and upright, rooted stumps.

The role of coarse woody debris can be divided into four inter-related categories:

- Role in productivity of forest trees

The slow release of nitrogen back into the soil horizons from the decomposition of large woody debris improves the productivity of the forest at micro site level.

- Role in providing habitat structure to maintain biological diversity.

Sites for nests, dens and borrows; habitat for microbial decomposers; energy source for complex food web; moist micro-sites for insects, worms and fungi; travel ways across streams, the forest floor and beneath snow; cover from temperature and predators.

- Role in geomorphology of streams and slopes.

Upland sources of coarse woody debris contribute to soil stability; soil surface stability, prevention and erosion of storm surface runoff; and large woody debris loads in streams.

- Role in long-term carbon storage.

Next to fossil fuel burning, the most critical factor in the increase of CO_2 is the atmosphere is the reduction in carbon storage of our forests. Long-term carbon storage is affected by the removal of material from the forest only if, after removal, the carbon is released more quickly.

Depending on the moisture and temperature regimes of an ecosystem, CWD may:

- Add a significant amount of organic matter to the soil;
- Provide habitat for organisms;
- Retain moisture through dry periods, providing a refuge for ectomycorrhizal roots and associated soil organisms
- Provide a site for asymbiotic or associative nitrogen fixing bacteria
- Represent a capital pool of nutrients for the ecosystem
- Provide a site for regeneration; and
- Contribute to soils acidification.

ETC Inventory Findings:

The inventory implemented on ETC involved 954 sample points. At each point two data sets were collected to facilitate a better understanding of dead, down and decaying coarse woody debris. The first data set is based on traditional point sampling processes where standing dead stubs of at least 4.5 feet in height (point at which DBH could be measured) fell into the prism point they were tallied with species and diameter. To set these aside from other live tallied trees the cruiser would label the tree a cull. This was designed not to generate volume, but to get an assessment of standing dead trees per acre (see Table next page). Note that some of these stems were complete trees that had recently died and others were literally tall stumps at just over 4.5 feet in height. Though no statistical correlation between the tally of dead stubs on ETC with other ownerships has been made, there is an observational correlation with the long-term history of high grading and the negative impact from the 1998 ice storm when analyzing the significant number of standing dead snags both tallied and observed on ETC.

ESSEX TIMBER COMPANY
STANDING DEAD STUBS/TREES
SUMMARY OF FINDINGS

STAND	T/A W/ DEAD TREES	T/A W/O DEAD TREES	DEAD T/A NET TALLY	% DEAD OF TALLIED TREES
H1B	304.0	294.2	9.8	3.2%
H2B	1491.5	1475.2	16.3	1.1%
H3A	803.8	786.0	17.8	2.2%
H3B/H2B	1035.5	1018.5	17.0	1.6%
H3C/H1B	781.0	761.4	19.6	2.5%
H4C/HS2B	773.0	749.1	23.9	3.1%
HS2-3A	2222.4	2214.1	8.3	0.4%
HS2B	1067.9	1033.7	34.2	3.2%
HS3B	606.3	572.0	34.3	5.7%
HS3C/HS2C	516.5	485.2	31.3	6.1%
HS3-4A/HS2B	648.3	615.7	32.6	5.0%
S1A	1613.4	1568.2	45.2	2.8%
S2A	2651.5	2614.0	37.5	1.4%
SH34A/SH2B	1236.9	1183.0	53.9	4.4%
SH3B/SH2B	1269.4	1195.7	73.7	5.8%
SH3-4B/SH2B	1074.9	1025.7	49.2	4.6%
SH3-4C/S2B	1385.1	1348.6	36.5	2.6%
AVG STANDING DEAD STUBS/ACRE/STRATA			**31.8**	**3.3%**

On average 3.3 percent of the stems found on ETC were dead. That in the experience of LandVest is a high percentage on an overall basis for a forest found in this region. Typically the snag and dead stub target levels as requested by wildlife biologists have been 2-3 per acre. The ETC forest is currently generating over 10 times that amount. In fact when combined with the following Coarse Woody Debris (CWD) tally shown in the table below the forest resource of ETC apparently is not lacking in the current level of Coarse Woody Debris and is well situated to maintain a flow of CWD from this high percentage of standing dead snags and stubs.

The second set of data results were collected under the following specifications for DOWNED COARSE WOODY DEBRIS: CWD is defined as any dead bole section that is lying completely on the ground, unsupported by any other free-standing tree, living or dead. CWD will be measured using the perpendicular distance sampling method described here. The diameter of all downed logs that are "in" will be measured perpendicular to plot center to the nearest inch class at the point where the log is perpendicular to plot center. Species and Maser decomposition class will also be recorded. "In" trees meet the following criteria:

- Log is perpendicular to a straight line extending from plot center (Appendix)
- Diameter at the log center is 4.6" or greater
- Log is within the limiting distance defined by its diameter (Appendix)

ESSEX TIMBER COMPANY COARSE WOODY DEBRIS
SUMMARY OF FINDINGS
COARSE WOODY DEBRIS SAMPLING RESULTS

SPECIES	NUMBER OF STEMS
AMERICAN BEECH	16
BALSAM FIR	138
EASTERN HEMLOCK	5
SUGAR MAPLE	37
OTHER HARDWOOD	4
ASPEN	1
RED MA[PLE	40
RED SPRUCE	22
WHITE BIRCH	11
YELLOW BIRCH	84
TOTAL NUMBER OF CWD STEMS	358
AVERAGE CWD DIAMETER	9.2 INCHES
AVERAGE TALLIED CWD PER POINT	0.38

The Coarse Wood Debris Summary Table demonstrates that on average there was a measured CWD stem on nearly 40% of the 954 sample points. From an observational standpoint this is a high percentage, especially in a forest that was heavily harvested and often through whole tree systems where little of the merchantable stems were left behind from targeted removals. This data set, in conjunction with the standing dead stem data discussed above supports the modeling provided by LandVest that indicates and then recommends the need to provide a significant increase in the annual harvest to capture potential mortality and remove declining and slower growing overstories so that more vigorous and higher quality stands can be either released or established over the next ten years.

The importance of this data from a biological diversity standpoint is still subject to both further analysis and discussion. ETC and their managers are continuing with the analysis and understanding of CWD information gathered during the inventory including the size class distribution and the distribution by stand type on the landscape. The current trend in sustainable forest management is to provide a somewhat lower level of utilization to insure that the forest floor has sufficient CWD to support vertebrate and invertebrate populations that play an important roll in the food chain, nutrient cycling and overall richness and diversity that provides for a healthier and more robust ecosystem.

- Looking at the forest through the results of the inventory there is an ample level of CWD on the ground and a steady and available source of standing dead trees to source future CWD. As this is an important consideration in a biologically aware forest management program, ETC will insure through their planning process that CWD levels will remain sufficient and will react to changes in the research as to what are suitable levels of CWD and standing dead trees. As the forest management program becomes active and the recommendations of this plan are implemented, there will need to be a careful consideration of the maintenance of both target levels of CWD and

Dead Standing Snags and Stubs as the forest becomes healthier and is stocked with more AGS and higher vigor stands.

Comparing the inventory from 1999 and the current inventory it would be expected to see a substantial increase in stocking. Even in unmanaged forests in this region over an eight-year period a net growth, especially considering the very low volumes harvested by ETC, would be expected to have exceeded 2.8 cords/acre in total. The new inventory demonstrates that this has not occurred and the evidence provided by the dead tree and CWD tallies supports that position. In many instances trees that were alive to be tallied in 1999 have died and now are either providing CWD on the ground or snags in the overstory. While this certainly assists in the development and maintenance of a biological diverse forest it more than likely is evidence of a forest in decline and in need of what is recommended in this plan; a restructuring of the forest to provide for a younger and more vigorous average stand across the ownership. This will then provide the quality, the growth, and the vigor to achieve the long-term goals of the easement for a more sustainable and valuable future forest.

Wildlife and Legacy Trees

Harvesting will balance the economic and ecological consideration with regards to wildlife and unique features such as legacy trees. Since harvesting impacts not only the trees, but wildlife communities too, it is important to retain opportunities for these wildlife communities to benefit from our actions. This will include retaining snag trees, creating vertical structure within the canopy and retaining coarse woody debris. ETC is home to numerous herbaceous plant communities and both game and non-game species. There is also an overabundance of moose on the property that has become a factor in management

Den and snag trees are maintained where possible during active operations. Oversized trees, trees with visible cavities, and large trees with forks in them are all good candidates for Legacy trees. Efforts will be made not only to leave these trees but to buffer them as well.

HARVESTING PROTOCOLS

Haul Roads

ETC has good access throughout the ownership via the existing network of town roads, private roads and trails. New haul roads may be constructed in compliance with Section III (12) of the Conservation Easement.

Existing haul roads will be used and upgraded to meet BMPs. The Best Management Practices to be considered are those developed as the baseline for regulatory compliance in Vermont, the AMP or Acceptable Management Practices published by Vermont's Department of Forests, Parks and Recreation. In addition there are many regional BMP publications and guidelines, including those for compliance with FSC Northeast Regional Standards that will be considered and complied with in the management of ETC. New haul roads shall follow the contour as much as possible with grades between 2% and 10%. Grades exceeding 15% are permissible for runs not more than 200 feet between grade breaks.

Proper drainage structures including broad based dips, rolling dips and culverts will be used to minimize water movement on the road surface. Cuts and fills will be minimized as much as possible and haul roads kept to minimum essential width to reduce exposed road surface. Haul roads must be 'day-lighted' as needed to assure rapid drying of the road surface. Any haul road crossing perennial or

intermittent streams will utilize properly designed and installed structures that may include bridges, temporary bridges, or properly sized culverts.

Skid Trails

With ETC's long history of timber management, skid trails traverse most areas. In most cases, these trails have been well cared for during and after use, i.e., they have been buttoned up properly, and will work adequately for the next harvest entry.

When at all possible, dispersed overland skidding shall be used. Furthermore, existing skid trails shall be used when they meet current specifications. Skid trail gradients should not generally be greater than 15%. Steeper slopes may be required to avoid boundaries, sensitive areas, or other areas that would otherwise be unreachable. Trails greater than 15% must be kept to a minimum and receive more frequent maintenance during active operations. Any trail leading to a natural drainage must utilize a suitable culvert or bridge.

Landing/Log Decks

All landing and log deck locations must be approved by the property manager prior to their construction and use. They must be at least 50 feet away from any SMZ. They should have a slight slope (2% to 5%) to allow for drainage. All decks and landings will be re-graded after active use is finished. Re-vegetation will occur in instances where there are aesthetic or erosion concerns, or when wildlife plantings are desired. Otherwise decks and landings will be allowed to re-vegetate naturally

The cutting contracts and verbal instructions in the pre-harvest conference will ask the loggers to remove tops from the landing and to re-distribute slash piles into the harvest site. The burning of slash and stumps will be used only where it is ecologically justified (e.g., for pest control).

Streamside Management Zones

Section IV 2 of the Conservation Easement reads, in part,

Surface Water Buffer Zones.

The following restrictions shall apply to wetlands, streams, rivers and ponds depicted on the Conservation Plan, which plan depicts so-called "blue line streams" as identified on 7.5 minute United States Geologic Survey Quadrangle maps which include the Protected Property.

a) There shall be no harvesting or other forest management activities conducted in wetlands or within 50' wetland buffers depicted on the Conservation Plan.
b) There shall be no harvesting or other forest management activities conducted in those areas lying within 50' of each bank/shore of streams, rivers and ponds depicted on the Conservation Plan. Stream crossings are exempt from this restriction, but the number and width of such crossings shall be kept to a minimum and said crossings shall include the installation of all erosion control devices and employ all recommended practices described in the Vermont AMPS or another BMP standard of equal or greater level of protection.

In addition, Vermont has a number of rules and regulations that protect water resources and streamside management zones (SMZ's). These include both Federal and state laws. In general, they

are designed to maintain water quality, prevent soil erosion and protect riparian habitats. Specifically, the laws that protect SMZ's on ETC include:

- Erosion and Sedimentation Control Law
- Acceptable Management Practices
- Heavy Cutting Law, Act 15
- Use Value Appraisal for Forestland
- Act 250 requirements for harvesting over 2500 feet in elevation

Buffers in which activities are curtailed by regulation range from 0-75 feet. In most cases, some activity is allowed. The following definitions and descriptions will be used to guide forest managers in assessing buffer widths and prescribing activities near streams as well as wetlands and standing water

Definitions

Ephemeral Streams

An ephemeral stream is defined as "a stream that flows only during and for short periods following precipitation and flows in low areas that may or may not have a well-defined channel." Some commonly used names for ephemeral streams include: storm water channel, drain, swale, gully, hollow, or saddle. Ephemeral streams do not require an SMZ and usually do not have a defined channel. However, it is strongly encouraged that skid trails, roads, site-prep, and other soil-disturbing activities be minimized in the ephemeral streams to avoid erosion and sedimentation of storm water runoff that will flow downstream into streams or water bodies.

Intermittent Streams

An intermittent stream is defined as "a stream that flows only during wet periods of the year (30% - 90% of the time) and flows in a continuous well-defined channel." During dry periods, especially in summer months, intermittent streams may go down to a trickle of water and make it appear dry, when in fact there is water flowing through the stream bottom or "substrate". This is usually caused by the seasonal changes of the local soil water table or during periods of long-term drought. The CE does not require a no harvest buffer on these streams.

Perennial Streams

Perennial streams are streams "that flow throughout a majority of the year (greater than 90% of the time) and flow in a well-defined channel." However, perennial streams can still 'dry up', particularly during extended periods of drought. Therefore when classifying stream type, it is important to check appropriate map resources and seek assistance from a professional who has been trained in stream determination. Though not completely, these streams typically appear on the Conservation Plan, along with 1st, 2nd, and larger order streams.

Essex Timber Company recognizes that each stream has a unique combination of features that determines the appropriate buffer width, including location, slope, elevation, soils, vegetation, and other riparian values. ETC will use the following general guidelines for determining widths and practices within streamside management zones:

- The larger the water body (higher order of the stream), the larger the management zone.
- The more intense the harvesting activity outside the management zone the larger the management zone.

- The management zone will be large enough to include associated wetland areas, ecologically or visually sensitive areas, steep slopes, and areas with sensitive soils.

To properly provide operational layout that will insure compliance with the protection of both eased no harvest buffers, as well as operational buffers designed to comply with sustainable forestry practices not required as a term of the easement ETC will follow these procedures:

- The buffers will be identified during pre harvest assessments and harvest planning to insure that silvicultural prescriptions are appropriately modified to reflect prescription guidelines from the ETC plan and AMP or BMP standards. In general:
    - Ephemeral Streams will have minimal no harvest buffers except when unique associated features are present, but will be avoided by harvesting equipment.
    - Intermittent Streams will have an established harvest buffer ranging from 25 to 75 feet with prescribed treatments within the buffer. The actual width and treatments within the buffer will be dependent on the combination of previously discussed features that are present.
    - Perennial Streams not identified in the conservation easement will have an established harvest buffer ranging from 50 to 75 feet. Minimal harvesting will occur in the first 25 feet of these buffers, with the remaining area treatment dependent on the combination of previously discussed features that are present.
    - Blue Line and larger order streams will have a minimum of a 50-foot no harvest buffer to remain in compliance with the CE. These will be expanded to include associated wetlands and other important associated features when appropriate.
- Forestry staff will identify and locate on the ground with paint the edge of no harvest buffer areas so as to prevent entry by harvesting equipment.
- Crossings for all stream types shall be identified on the ground by forestry staff based on AMP or BMP guidelines in order to avoid erosion and sedimentation.

Management of Steep Lands

Essex Timber Company and their land manager acknowledge the need for protections on steep slopes in order to maintain soil stability and control erosion. However much of the acreage owned by ETC is on slopes in excess of 15% gradient. Additionally, many stands have minor steep slope components that when combined with the presence of streams and other sensitive areas it is unavoidable to have skid trails with excessive slopes. For these reasons ETC has committed to the use of excavation equipment to stabilize skid trails on all harvesting operations, including installing permanent water bars and mitigating other soil disturbances that have occurred during harvesting (including filling in skidder ruts). With these considerations, the following is the general policy for operating on steep land and slopes.

- Every effort shall be made to minimize skid road construction on steep slopes.
- All skid roads will be constructed along the contour if at all possible.
- Skid road gradients should not be steeper than 15% with the exception that steeper segments may be required to avoid boundary lines, sensitive areas, rock breaks or other areas not accessible using skid roads of lesser grades. If steeper grades are

necessary, practices will be used to prevent concentrated water flow during periods of rainfall events.

- Skid roads shall climb upslope on a slant or zigzag pattern to break grade whenever possible. In some instances this will require the use of excavation equipment to "cut in" a skid trail with an appropriate grade and adequate drainage.
- Upon completion of skidding, areas of steep slope shall have water bars installed. Water bars will be installed at the appropriate interval as recommended by the State of Vermont AMP manual.
- Skid roads over 50% slope for any distance shall be considered critical areas and will be water-barred, mulched and seeded after completion of use.
- Primary skid roads are to be constructed with a minimum of approximately 300 overland feet between roads wherever possible.
- Alternative logging systems, such as high-lead cable systems, will be considered if at all possible.

General Marking and Harvest Layout Guidelines:

Guidelines for marking and timber sale layout of each stand will vary on a case-by-case basis and be provided for in the THP process. Managers will have a working knowledge of the parameters of the timber sale including silvicultural goals, operational considerations and special resource considerations in addition to experience with log grades, cull and defect indicators, and indicators of tree vigor and response to release. The following process will be employed in laying out most sale areas:

- Harvest boundaries will be delineated through natural features or more commonly two stripes of red paint to ensure that the treatment area is well defined. Any harvests in proximity to property lines will necessitate an updated marking of the property line.
- Streamside management zones as determined through the timber harvest planning process will be identified and marked in the field with two stripes of red paint. In cases where limited harvests will occur within the SMZ these trees will be designated using traditional selective marking techniques, and blue paint.
- Special protection areas for important resources such as vernal pools, seeps and other wetlands will be delineated, again with two stripes of red paint.
- Primary skid trail layout will be accomplished utilizing flagging. Though the general location of primary trails will be designated, operators are given some flexibility in making minor adjustments. All stream crossings will be determined during skid trail layout.
- When utilizing groups or patches or some variation of these, the perimeters of the groups or patches to be harvested will be designated using two stripes of blue paint. In these cases trees with paint are reserved from harvest.
- When utilizing groups or patches retention stems within selected groups will either be painted with a red "X" or "W", or reserved by prescription, depending upon the goals of the treatment.

For individual tree and small group harvesting prescriptions, which include thinning, crop tree release, and individual tree selection systems, the following guidelines will be utilized. These will also be pertinent when selecting retention stems for shelter wood and seed tree harvests.

- Size: Trees marked to be harvested shall include all size (DBH) classes identified in the THP. A general rule is to consider those trees of the size that will increase over the investment horizon from pulpwood to small sawtimber or from small sawtimber to large sawtimber.
- Species: All species in the stand can be considered for marking. Concentrate on those higher value species to leave as crop trees in the residual stand. Regardless of value, retaining stems of a variety of species and condition, including the retention of snag trees on each acre as wildlife trees will serve to achieve and develop further biological diversity on the ownership.
- Quality: Mark trees for removal that have visible defects such as cat faces, frost cracks, lightening strikes, damaged tops, and visible signs of rot. When possible, leave one or two defective stems per acre as wildlife trees. High quality stems have no visible or detectable defects and which have good prospective growth potential and should be identified as crop trees by the THP prescription. The goal of any prescription should almost never be the complete removal of UGS, unless the retained level of AGS achieves the appropriate residual basal area target. The retention of UGS should insure that thinnings will leave a residual stand with suitable B-Level stocking.
- Crown Density: Crop trees to be left in the residual stand should have a high live crown ratio in order to respond well to release from surrounding competition. Crop trees should have nice, well-shaped and undamaged crowns. Trees market for removal should have underdeveloped, damaged, or malformed crowns.
- Stand Position: Each crop tree must be well spaced from surrounding competition but not yet left open enough to be subject to epicormic branching, wind throw, ice damage or lightening strike.

Reports

The following is a list of reports related to management activities and issues as utilized by ETC and their manager. Copies of these reports can be found in Appendix E.

- Pre-Harvest Stand Assessment Form: Used to evaluate on a stand-by-stand basis the individual stands available for treatment within a given year. The evaluation includes cruise information as necessary to determine the specific nature and conditions of the stands in the unit.
- Timber Harvest Plan: These are developed on a stand specific basis to ensure that silvicultural treatments meet stand conditions and the goals of modeling. THP's include provisions for sensitive areas, wildlife habitat, stream buffers, and other non-timber considerations, and are accompanied by operational maps.
- Contract File Checklist: These are developed to ensure that all necessary planning documents have been completed, approved, signed, and delivered to all parties with status to the sale. The checklist ensures documentation of compliance with the conservation easement, State permitting and program requirements, and ETC planning, contract and insurance requirements. The checklist is attached to the cover of operational file folders.
- Negotiations, Layout & Pre-harvest Planning: These are utilized to document pre-entry walk through and communication with the contractor and discussions on operational procedures, silvicultural intent, sensitive area concerns, contractual and regulatory requirements and other information pertinent to the successful completion of the sale.

- Safety and First Aid Protocol: Posted at each job site with copies located at the manager's office, the safety and first aid protocol sheets are used to ensure emergency numbers are readily available to contractors in the field and that directions to the job site are readily available at the manager's office.
- Harvest Inspection Form: Utilized to ensure inspection by forest managers and contractors compliance with safety and operational procedures. All compliant and non-compliant actions are documented and acknowledged by both forest managers and the contract and a corrective action plan is included under comments if necessary. Once the corrective action has taken place a new harvest inspection form is completed to show compliance.
- Post Harvest Evaluation: These evaluations are used immediately following harvest to document the outcomes of individual treatments. These are in essence a follow up to determine if the goals of the Timber Harvest Plan were met, and if any operational improvements can be made for future treatments.
- Road Inspection Form: Developed early on in the tenure of ETC to gain an assessment of road conditions. These have largely been replaced by GIS mapping and database management implemented by forest managers in co-operation with the Vermont Department of Forests and Parks.
- Bridge Inspection Form: Developed early on in the tenure of ETC to gain an assessment of bridge conditions. These have been used in limited instances to document the deterioration of individual bridges and develop plans in co-operation with the Vermont Department of Forests and Parks for their repair.
- Camp Inspection Form: Also developed early on in the tenure of ETC to ensure leaseholder compliance with the ETC camp lease policy, and to document any issues relative to water quality, special area protections, and fire dangers.
- Incident Report: Since the Agency of Natural Resources has the primary enforcement authority for most prohibited public uses and compliance with the Recreational Access Easement, these forms are utilized to document encounters with unauthorized public access use of ETC lands. These forms are also used to record observations of chronic and repeated use violations such as ATV activities in certain "problem" areas. Forms are retained on file and forwarded to the appropriate State contact person.

PART IV - ONGOING OPERATING PRACTICES

MONITORING & TRACKING

Essex Timber maintains a record of all products harvested from the Essex forest. Contract number, town, location, species and/or species group and products harvested are recorded and tracked by location and contractor.

The contract year runs from April through March of the following year.

At the time of delivery to a purchasing mill a delivery slip is created that records the sale. Generally within two weeks a sale summary and payment is received. The summary sheet itemizes the products purchased by landowner, species, grade, volume and price.

Essex Timber has a trip ticket system used to track loads shipped from each site. Information on the trip ticket includes:

Job Number
Date
Logging Contractor
Destination
Location
Loading Contractor
Trucker
Product
logs # ties

The slips are returned from the mill with the corresponding sales summary. The manager cross references all tickets and maintains a record of lost or missing tickets. A financial penalty is assessed any trucker for failure to use a trip ticket or for a lost ticket.

Contracts with logging contractors and truckers are maintained on file, as are any contracts with mills where the timber has been sold.

Foresters maintain a pre-harvest and post-harvest assessment record of each harvest site. These forms are maintained on file and available for review.

Pre-harvest operational cruising is conducted in a sub-set of stands scheduled for harvest in the near term.

Essex will continue to maintain a detailed record of harvests and sales.

HARVEST CONTRACTING

The local logging capacity and infrastructure is very well developed, with many skilled, well trained logging contractors who can carry out harvesting operations. Operators range from a single skidder and hand felling technique to fully mechanized operations, giving managers the ability to match the operators and equipment to individual site and silvicultural requirements.

Essex Timber contracts logging and transportation services to conduct its harvests.

Essex Timber Company has made a commitment to using well-trained, professional contractors. At a minimum, all contractors have been enrolled in a Sustainable Forestry Initiative approved program, with most contractors and their crews having completed their certification requirements.

MARKETS & UTILIZATION

When discussing regional markets in northeastern Vermont, one has to consider the greater northeast region. Most markets are located in northern New Hampshire, Maine, New York, and the Province of Quebec. Many sawmills in Quebec are closer to the land base than those in neighboring states.

Regional markets for all species and grades of sawtimber remain strong. Certain species and grades of sawtimber have been holding steady or increasing in value for a couple of years. The spruce and fir sawtimber market is a bit soft, though demand and pricing remains higher than five years ago.

There are several concentration yards that have been consistent buyers of ETC's hardwood sawlogs.

Markets for low-grade material have declined, particularly following the bankruptcy of American Tissue Corporation, which caused the closure of their Berlin/Gorham, New Hampshire mill. Other paper producers in the northeast have decreased demands for pulpwood, depressing those markets. Alternative markets are also in flux, including wood to energy plants and firewood markets.

ROADS & ACCESS

There are approximately 159 miles of access roads on the property. These can be divided into gravel surface roads providing year round access and unimproved roads providing winter access. This system of access roads is largely in good shape with suitable drainage and stream crossings. Gravel sources for road maintenance have been well developed on the property. Stream crossings consist of a combination of large culverts, timber bridges, and steel bridges.

Roads, gates and bridges are periodically inspected for condition. Much of this is accomplished during the course of other forest management activities, and immediately following spring break up and major summer storm events. Problems are documented and necessary repairs and maintenance take place at the appropriate time.

ETC will continue to cooperate with the Agency of Natural Resources on road maintenance issues and projects subject to public access.

A maximum culvert size of 48" in diameter will be used for all new stream crossings. Temporary or permanent bridges will be used whenever stream flows exceed that capacity in order to minimize impacts on stream ecology.

Stream crossings will be upgraded and or maintained during the period of July 1st to September 30th in order to minimize stream disturbance and impacts to spawning Salmonids.

All roads are maintained in accordance with AMPs.

PUBLIC ACCESS EASEMENT

Much of the road system is open to the public under the provisions of the Public Access Easement. Public access is governed by a long-term access plan developed co-operatively with the Vermont Agency of Natural Resources. These roads are managed and maintained co-operatively with the St. Johnsbury office of the Department of Forests, Parks and Recreation. Public access is not required on certain roads and Essex has management and maintenance responsibility for those roads. A system of gates is utilized to limit access to designated areas and to enforce seasonal road closures.

Public access is governed by the *Long Term Access Plan for the Private Timberlands Portion of the Former Champion Lands*, (the "LTAP") as provided for by the Public Access Easement. A copy of the plan is available from the State of Vermont, Department of Forests, Parks and Recreation.

The purposes of the Access Easement include:

(1) Providing perpetual public access to the Property for traditional recreational purposes as well as other uses, which may not be traditional but are compatible with the purposes of the easement?

(2) Limiting adverse impacts on Landowner's use of the Property, especially forestry use.

(3) Providing dispersed, public access for traditional recreational uses while confining motorized, mechanized and equestrian access to mapped "Recreation Corridors."

(4) Linking those Corridors to adjacent public lands and trails.

(5) Encouraging cooperation between Landowner and the Holders in implementing access.

(6) Effectively managing public access through an access plan and identified access managers.

(7) Fulfilling the purposes of the Conservation Easement.

Public access will be limited or restricted in areas of active harvesting as permitted by the Public Access Easement.

ETC will continue to work co-operatively with the Agency of Natural Resources to manage access consistent with the purposes of the Public Access Easement and the LTAP.

HISTORIC and CULTURAL HERITAGE SITES

In 2001, the University of Maine produced "PEOPLE, LAND AND HISTORY: The Cultural Landscape of the Nulhegan District". The report focused on the public portions of the former Champion lands, but listed four historic sites on Essex Timber Company property, all of which are known to

management. They are: the railroad turntable at Moccasin Mill; the POW camp in East Haven; a portion of the Magog Rd. in Brunswick; and the former railroad right of way, much of which is now the East Branch Rd. There are no known Native American sites located on Essex land.

One lease camp located in East Haven is known to have been a fire warden's camp. Two other features of some historical significance have been located on the property, an old wagon frame and an antique car.

Archeological, historical and cultural heritage features and sites will be incorporated into forest assessment and inventory forms, and will be located on a cultural heritage mapping layer.

Appropriate protection and conservation measures will be taken during timber harvesting operations. ETC follows the guidelines published in the Vermont Division for Historic Preservation's "PROTECTING CULTURAL RESOURCES DURING LOGGING, Recommended Practices for Protecting Vermont's Historic and Archeological Resources During Logging, rev. 1999.

LEASING PROGRAM

Sixty-one camps are present on the property. Each site is leased by ETC, and the lessee owns any structures and improvements. The Conservation Easement permits a maximum of three new camps, with certain restrictions. Essex Timber Company envisions keeping all leases active. Preservation of lease camps with historical importance will be encouraged.

Lessees are required to maintain their structures and leased areas in accordance with the terms of their lease. These terms include ensuring that the sites are clean, pose a minimal environmental impact, and pose no fire hazard.

Where appropriate Lessees will be permitted to mow and clear in order to maintain the aesthetic appearance of their premises and provide minimal benefits of forest openings.

Lessees will be allowed to cut poor quality wood for firewood as needed for their lease camp, with a three-cord per year limit. When possible, lessees will be encouraged to utilize logging debris on landings for this purpose.

FOREST PESTS

The major forest pests in the region are monitored by the Agency of Natural Resources through annual, statewide forest health sampling. Monitoring is performed through aerial and ground surveys, and much of the Essex Timber Company land is included in these surveys. Forest pests of immediate concern that are known to occur in Essex County include pine shoot beetle (Tomicus piniperda) and spruce budworm (Choristoneura femiferana). Species of major concern outside of Essex County include brown spruce longhorned beetle (Tetropium fuscum), and Asian longhorned beetle (Anoplophora glabripennis). No major forest pest outbreaks are currently occurring.

Managers will remain vigilant in the detection of forest pests while performing other forest management duties. Any detected species will be reported to the proper agency at the Department of Forests and Parks, and action will be taken under their supervision.

Herbicide Use –

Herbicide use for silvicultural purposes in the northeast is typically limited to site preparation and the control of weeds relative to planting, and the removal of hardwood competitors in stands targeted for spruce and fir production. Though the previous owner planned on using herbicides for these reasons, there is no record of actual use. Some stands on the property may benefit from the application of herbicides, particularly in areas where hardwoods are competing with spruce and fir.
However, given Essex Timber Company's objective of working with natural forest processes in order to promote good ecosystem health and land productivity, no herbicide use is planned.

Under the terms of the easement, herbicide use for the control of pest or disease outbreaks or for the control of exotic species will occur only under the recommendation and supervision of the appropriate State of Vermont Agency, and in compliance with the Conservation Easement.

Invasive Species –

While there are hundreds of non-native, exotic plant species in the region, most naturalize and blend in with existing natural vegetation. The four invasive species of greatest concern at present are

Invasive honeysuckles (Lonicera tatarica, L. morrowi), Japanese knotweed (Polygonum cuspidatum), Great reed or Phragmites (Phragmites communis), and Purple loosestrife (Lythrum salicaria). As of the date of this plan, there are some known sites of Phragmites on the Essex Timber Company Lands. These locations are limited to small patches (a few stems) along ditches. No other species have been detected but are known to occur in the region, particularly along the Connecticut River and its tributaries. All are most common on disturbed sites such as ditches, with the common mode of transport through vehicles and construction equipment.

Though none of these species pose a threat to timber productivity, these species can overcome native vegetation in wetlands and other areas, leading to the loss of native flora, species diversity, and wildlife habitat.

Managers will remain vigilant in the detection of invasive species while performing other forest management duties particularly along roadways and other access points to the property. With the detection of Phragmites, managers will establish a control program in cooperation with the Vermont Agency of Natural Resources, and immediate and appropriate action will be taken to control the species.

In an effort to slow or prevent the spread of invasive species onto the Essex Timber Company property, construction equipment such as bulldozers and excavators will be washed before performing work on the property. None of the current known sites with Phragmites are in areas that equipment has been operated during ETC's tenure of ownership.

WILDLIFE HABITAT & SPECIAL TREATMENT AREAS

The sub-division of the former Champion Lands was designed to limit the number of significant natural communities on the private ownership, placing these sites to the greatest extent possible in public ownership. Other properties adjacent to the Essex Timber Company property are also conserved through easements and/or ownership.

During field reconnaissance and inventory work, highly sensitive areas such as steep slopes and high elevation sites should be considered as reserve candidates.

ETC will cross-reference and thoroughly evaluate all harvests proposed in special treatment areas for easement compliance.

The Essex Timber Company property is said to be "rich in a diverse array of game and non-game species." (*Conservation Easement*, page 2). Truly, the property contains a variety of habitat types and species, in large part due to its size. This plan focuses on two important elements of wildlife management:

- An overall timber management approach of creating a mosaic of stand types managed on long rotations for a diversity of age classes, both within stands and between stands, creating the diversity which optimizes wildlife habitat management for the greatest number of species.

- Focusing on the identification of unique habitat values and altering management activities to protect and enhance those values through practices such as retention of cavity and den trees, providing for coarse woody debris, buffering wetlands, seeps and vernal pools, managing softwood inclusions, and retaining mast-producing stems.

The timber management approached is discussed in earlier pages of this plan. The identification of unique habitat values is accomplished through ongoing monitoring of the property and stand reconnaissance. Managers have also developed a timber harvesting protocol that provides for the identification of special resources and integrates them into harvest layout and GIS data layers maintained by managers (Appendix). ETC will continue to co-operate with the Vermont Department of Fish and Wildlife in managing natural heritage sites, as well as critical wildlife habitat. Natural heritage information will remain current through maintaining a natural heritage mapping layer

Managers provide for wildlife considerations in timber harvesting, including reservation of mast producing stems, retention of snag and den trees (2 or 3 per acre), wetlands protection, and water quality buffers. Course woody debris recruitment is incorporated into retention of snag and den trees, and exceptional debris that exists is avoided during harvesting operations.

Though much discussion occurs with respect to the impacts of forest management on wildlife species, it should also be noted that wildlife species can have major impacts on the management of forest resources. White tailed deer impacts on forest regeneration have been well documented in the literature in areas with excessive populations, with much of the work occurring in Pennsylvania and southern New England States. Moose have similar impacts in northern New England. These lands likely have the highest concentrations of moose in the State of Vermont. It is clear that some areas have had heavy browse damage and ETC will continue to advocate for a reduction in moose populations to levels at or near the 1996 level (See Moose Management Plan for the State of Vermont 1998-2007, Agency of Natural Resources)

Moose Browse Data:

As noted above ETC has been very engaged in the discussions revolving around the re-establishment of a very active and viable moose population that is moving into its 4th decade in the Northeast Kingdom of Vermont. To that cause ETC committed in this updated inventory to gather data on moose habitat, browsing and the impact this activity is having on the forest's of this ownership and the region. ETC strongly believes that the large moose population is having a detrimental impact on the forest, especially in a manager's ability to properly and effectively nurture a viable and desirable regeneration class. Additionally ETC strongly believes these impacts are creating biological concerns such as affecting species composition and size class distribution across the ownership. ETC is also concerned that meeting the terms and conditions of the Heavy Cutting law and Use Value Appraisal Program, the compliance with the conservation easement, and the desire to maintain FSC certification may be jeopardized if the current levels of moose browse continue to occur. ETC will continue to co-operate with the Vermont Department of Fish & Wildlife to gain an understanding of where the population is, what its impact on the forest is, and finally work to support an effective means for limiting the impacts of the moose to a sustainable level. To that end ETC committed to the collection of the data presented in this plan and is also strongly supporting other efforts, such as the recently completed aerial infrared moose survey implemented by VT F&W.

To accomplish the collection of data that might bring some empirical data to the observations of the ETC management team as well as the reported observations of other managers and adjoiners was a crucial goal of the 2006 ETC inventory. To that end several levels of data were collected. The first group was observational and the second was empirical. Yet we believe that both observations as well as plot data combined provide an eye opening confirmation that these forests have a real problem with the current moose population levels. The following highlights the system utilized to gather this moose browse/damage data:

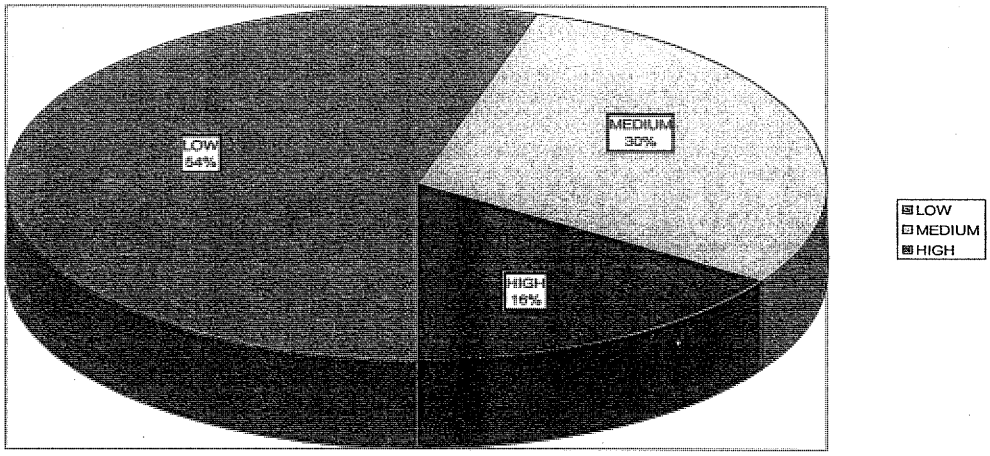
- On each point one of three observations were recorded.
    - Moose Browse Damage under the Insect & Disease data list
    - Winter Moose Yard under the Wildlife Habitat Categories
    - Moose Summer Habitat under the Wildlife Habitat Categories

- These observations were based on the cruisers ocular observations on and around point center.
    - If there was evidence of moose browsing that was more than incidental, in other words leading to damage to living trees, or evidence that seedling, saplings or small poletimber mortality or loss of vigor was occurring then the Moose Browse Damage call was indicated for Insect and Disease Damage.
    - If the area at or near the point sample was found to have evidence of winter yarding by moose then the Winter Moose Yard call was recorded for Wildlife Habitat. Typically these areas are found at higher elevation where the natural instinct for moose is to move high into deeper snow to avoid their one natural predator, the wolf. These areas are typically found with excessive browsing of species such as Balsam fir and Mountain ash. Heavy concentrations of moose dung are found in these areas.
    - The presence of ongoing and significant browse evidence in areas not deemed as winter use areas were tallied as Moose Summer Habitat. These areas had to have noticeable and protracted browse damage and a passing bit of moose feeding would never have achieved a tally. These areas could be very large in acreage; sometimes encompassing heavy browse levels across many acres.
    - The only conflict in the data collection for these observational calls if that a point could have a winter or summer call on the Wildlife side and a moose browse damage call on the Insect and Disease side as well. We can filter the data to avoid repetitions.

- To collect empirical data we utilized the same mil-acre regeneration plot that was employed for the tally of commercial and non-commercial regeneration levels. This process involved both an observational call and then a count to quantify the impacts of the browsing. The system was implemented as follows:
    - At each prism sample point a 1 mil-acre sample plot was established and then divided into 4 ¼ mil-acre quadrants. The quadrants were set starting at magnetic north and rotating NE, SE, SW, and NW with break points at the magnetic cardinal directions.
    - In each quadrant a visual observation was made to determine if there was evidence of moose browsing and if so at what level. These calls were made as none, low, medium and high.
    - If a quadrant was found to have L, M, or H moose browse observed then a tally of the seedlings and/or saplings was made. First the total number of stems in the quadrant that were not a component of the prism plot were counted, then from that sample the number of stems impacted by moose browsing was tallied.

These observations and tallies as presented in the following tables and charts provide for an interesting and enlightening set of data.

MOOSE BROWSE SEVERITY INDEX ESSEX TIMBER COMPANY 2006I



The Chart Moose Browse Severity Index (MBSI) above indicates that of the samples collected at point center where moose browsing was in evidence, (954, or 25% of the 3816 ¼ mil acre plots in total) 46% were observed with either high or medium levels of damage based on the ETC developed MBSI. This as noted above was an ocular observation. While a 25% rate of observed browsing may seem insignificant in many instances there were no seedlings remaining to tally due to prolonged moose browsing leading to mortality and the complete loss of available seedlings for browsing.

Moose Browse Severity Index: The goal of the moose browse data collection was to develop a means for assessing in as unbiased and objective a means possible the impacts that nearly three decades of expanding moose populations have had on the forests of ETC. Observational, as well as studies and observations in other regions have demonstrated that prolonged and increasing levels of browsing are having a negative impact on the structure, vigor and stocking of the understory on ETC and other surrounding woodland ownerships. ETC and its inventory contractor LandVest, devised a multilayered approach to the collection of data indicating the level of moose damage on ETC lands. As noted above there were several means for collecting this data. The MBSI was created to allocate this data across a variety of data sets from point samples to elevation. The MBSI is comprised of this system:

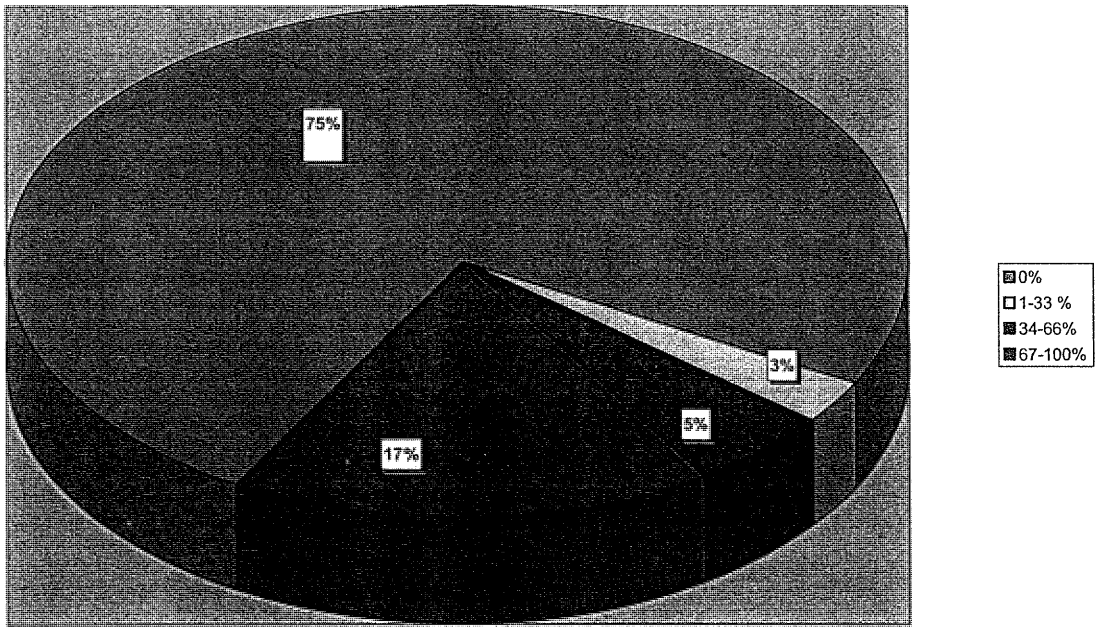
In each quadrant of the mil-acre plot taken on all 954 sample points, two sets of data were potentially available for collection. The first was observational, the second a tally. In step one each quadrant was reviewed for the presence of browsing and scored none, low, medium or high. a quadrant was tallied as a L, M or H a tally of total understory stems (all stems not included n the 1 inch and up 10 factor basal area point sample) were tallied. To ascertain the damage level, a count of those stems showing evidence of browse was tallied. A percentage browsed for the point was developed. These two sets of data were then built into the MBSI in this manner.

Browse Observational Level	MBSI Score/Quadrant	Browse %for 4 Quadrants	MBSI Score
None	0	0	0
Low	2	1-33%	2
Medium	4	34-65%	4
High	8	66% & up	8

The highest potential score would be 40 for a point sample. That would be for each quad being observed with a High level of browse (4 X 8= 32 total score), and the average for the 4 quadrants of stems impacted by browsing of 66% or more or a score of 8.

The goal of the MBSI was to create a data set that provided a reasonable and documented means for the development of an understanding of the impacts of moose browsing on the ETC landscape. This data is then presented both in chart and map formats in this plan and its appendixes.

PERCENT MIL-ACRE PLOTS BROWSED ESSEX TIMBER 2006



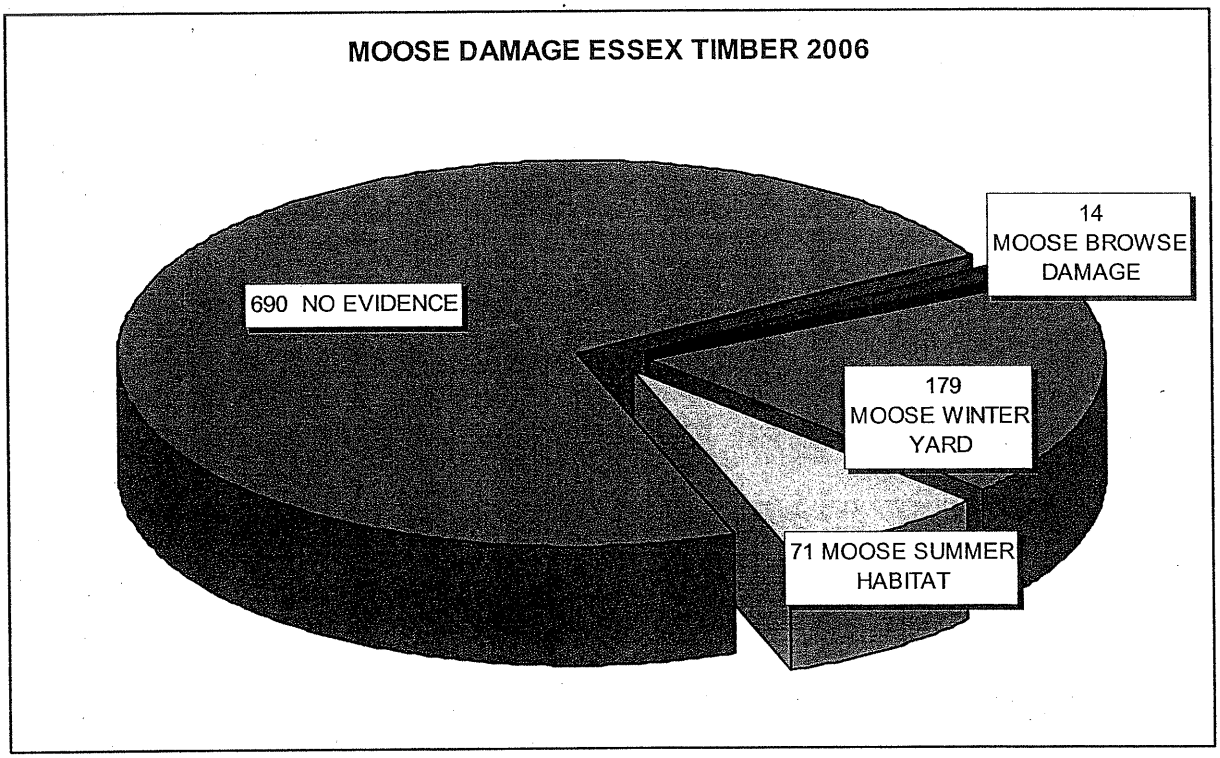
This chart summarizes the percent of browsed seedlings in comparison to the total tallied on a ¼ mil-acre plot that was observed to have moose browsing. The practice was as follows: On the same 4 quadrant Regeneration Plot, we recorded information to document moose browsing levels. The methodology utilized is: 1) For each quad of the Mil-acre plot, record a yes or no for the evidence of moose browsing. 2) Next make an objective value judgment as to the level of browsing, light, medium, or heavy. Light damage would be evidence of browse, but no immediate danger to the loss of a viable regeneration class in the quad. Medium would be significant damage, but trees capable of recovery without further browsing occurring. Heavy damage is where the moose browsing activity has significantly altered the form and vigor of the available regeneration of any species and even with the removal of further browsing there is insufficient health and form to insure the regeneration will develop into a viable acceptable understory. 3) To get a numerical sense of the damage for each quad where there is indicated the presence of moose

browsing of any level, we count the total number of stems of regeneration of all tree species, commercial and non-commercial, then a tally of the number of those that have been impacted by moose browsing.

Therefore this chart shows that in the 25% of the plots that were observed to have browse damage was tallied as follows:

- Heavy 649 quadrants
- Medium 191
- Light 114

While a 25% tally and then 32% of the browsed plots showing medium or light damage may appear to minimize the impacts of the moose damage on ETC, in fact this stratified inventory process demonstrated there is a broad range of damage across the ownership. A review of the mapping of the damage on an elevation basis, (see Average Severity Index by Elevation chart below) shows that moose are having a widespread impact on the resource. The browsing damage is now moving into its third decade on some acres. The regeneration class has been so damaged that there is no retained commercial regeneration available for browse. The tally methodologies would not work empirically in these areas, but are more significantly noted in general landscape observations as can be seen in the following chart.



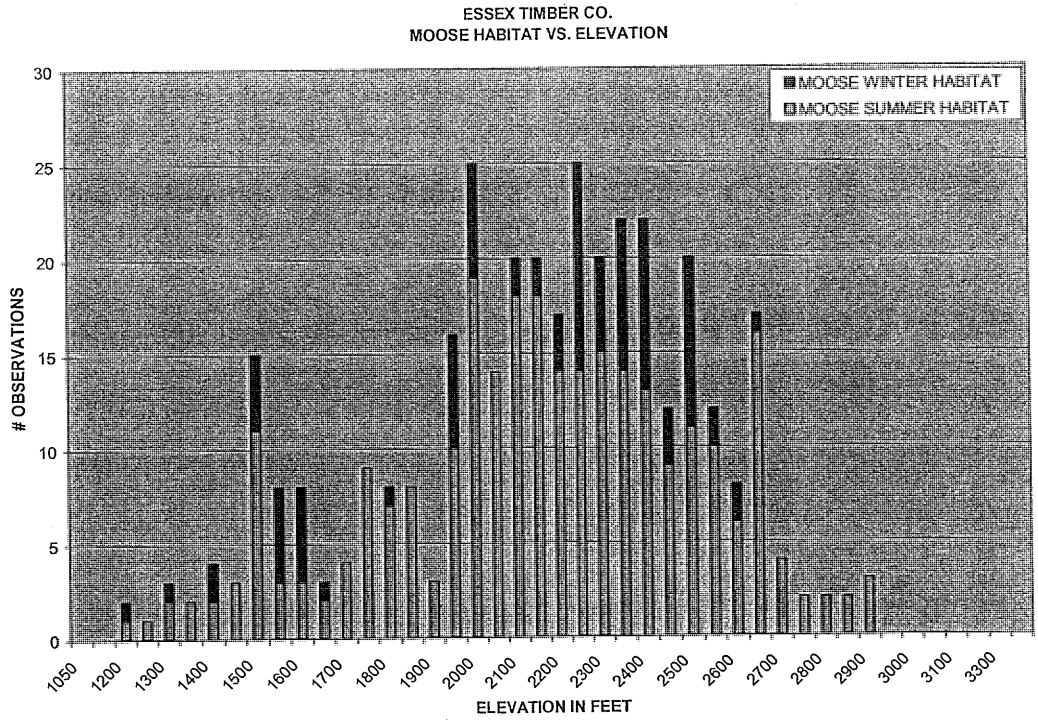
This chart is based on visual evidence of moose browsing and damage in the area of a particular point sample. In this case damage was noted on nearly 28% of the point samples. When you look at a parcel of this size where the point samples were distributed to achieve an accurate stratified random sample, ETC would suggest that these observations along with the empirical mil-acre data demonstrates that while forest management can establish ample seedlings of commercial species it is becoming near impossible on many acres to establish a viable understory that will likely grow and develop into a new forest

overstory. As we have recently learned through decades long research carried out by the USDA Forest Service and Yale University School of Forestry it may take up to 35 years for stands to reinitiate from dramatic site disturbance.

Moose Browse Tally Summary of Findings:

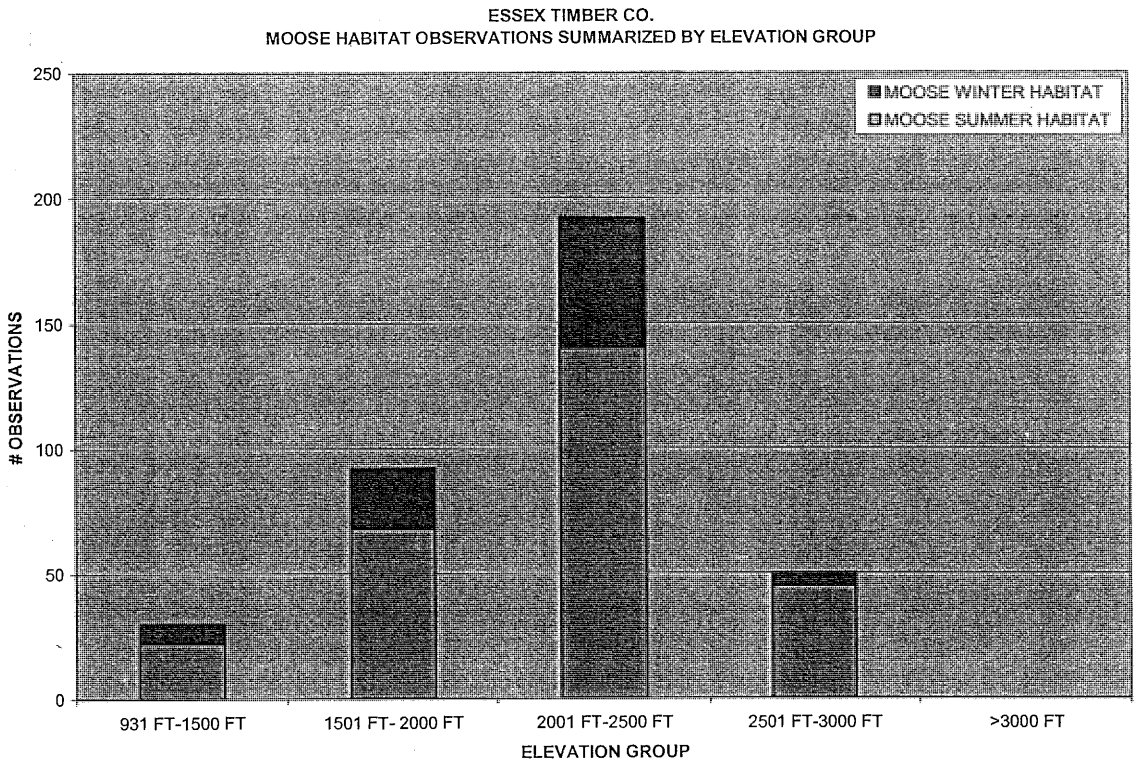
- With a total of 25% of the 954 mil-acre plots established demonstrating some level of moose browse damage this data clearly demonstrates that manager's observations of a strong correlation to moose damage on ETC is in fact a reality.
- Out of the 25% of the points tallied with some level of moose browsing 68% of the plots had over 67% of the tallied stems in the plots browsed. In other words 2/3rds of the stems in a plot were found to have moose browse damage. With 68% of the plots demonstrating damage at these high levels the data clearly indicates that moose browsing, on selective sites is negatively impacting the capability of the forest to develop a viable and desirable regeneration class.
- Of the 954 total points sampled 27.7% of the points had some indication of moose browse damage or use. This again demonstrates wide spread moose browsing impacts across the landscape of ETC.
- While the cruise differentiated amongst summer and winter moose use this was somewhat subjective as to the season of use. Often the position on the landscape was a strong influence on the call. The species being browsed also had some influence as the classic winter habitat, as noted previously, is at higher elevations and often dominated by Balsam fir and Mountain ash. But the important consideration is that these observations were only tallied if the moose were negatively impacting the understory and the damage and level of browse was considered a limiting factor to future forest management opportunities.

The following series of charts and tables provides a summary of the impacts of moose browsing on an elevational basis. We believe due to the data collected in the field as a component of the ETC 2006 inventory there is a strong correlation as to the levels of moose browses damage and elevation. This in turn provides for further evidence that moose are negatively impacting ETC and across a large and rather significant acreage. The heavy damage is occurring on over 36,000 acres and the moderate to heavy damage on an additional nearly 27,000 acres.

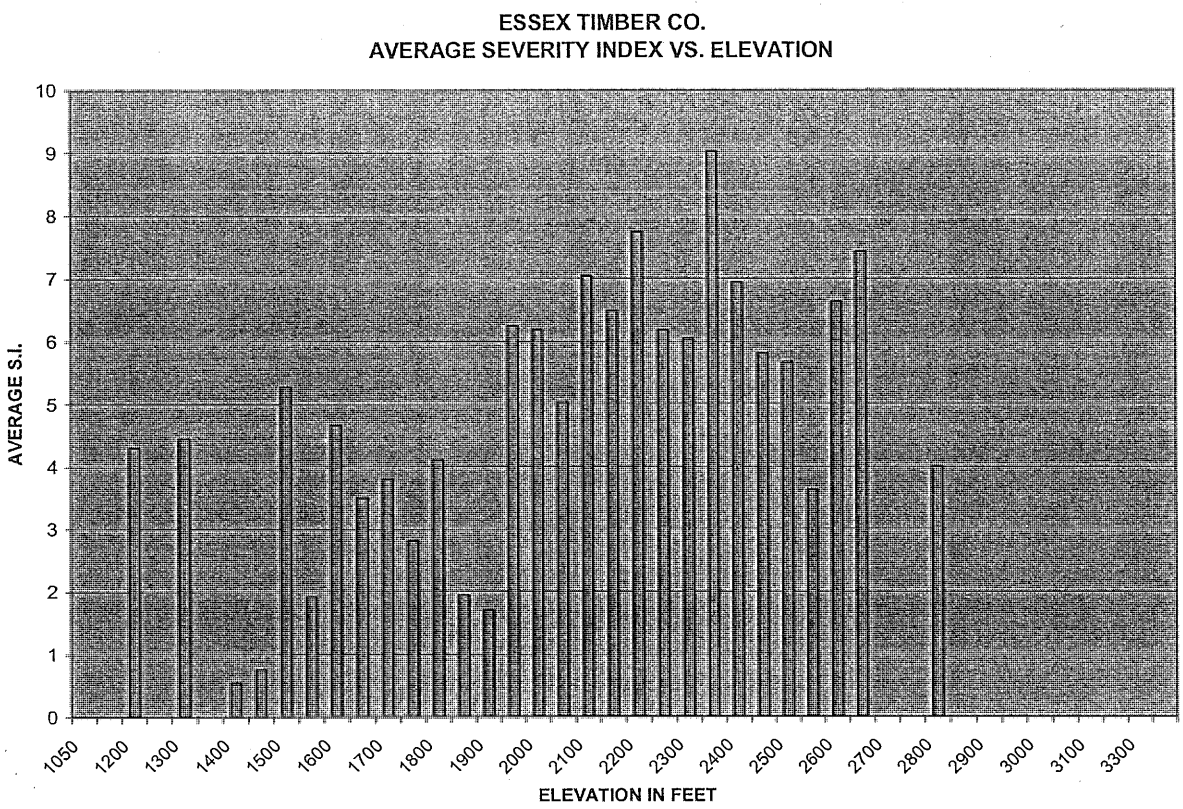


This chart demonstrates the location and frequency of cruisers observations of general moose habitat impacts. Each point sample charted is a function of the number of calls for either winter or summer moose use (demonstrated by historical browsing and other moose impacts found at or near point center and the points vicinity). There is, for the most part, a lack of moose browse damage at elevations of less than 2000 feet and there is a significant drop off over 2700 feet of elevation. Most of the ETC ownership is in the range of 1800 to 2500 feet. From a management consideration this broad evidence of damage in the range of the most productive sites, both for hard and softwood poses a dilemma. Many of the recommended silviculture is to be implemented in this portion of the ownership, yet there is a problem with establishing regeneration that can develop into a viable understory as long as the moose damage continues..

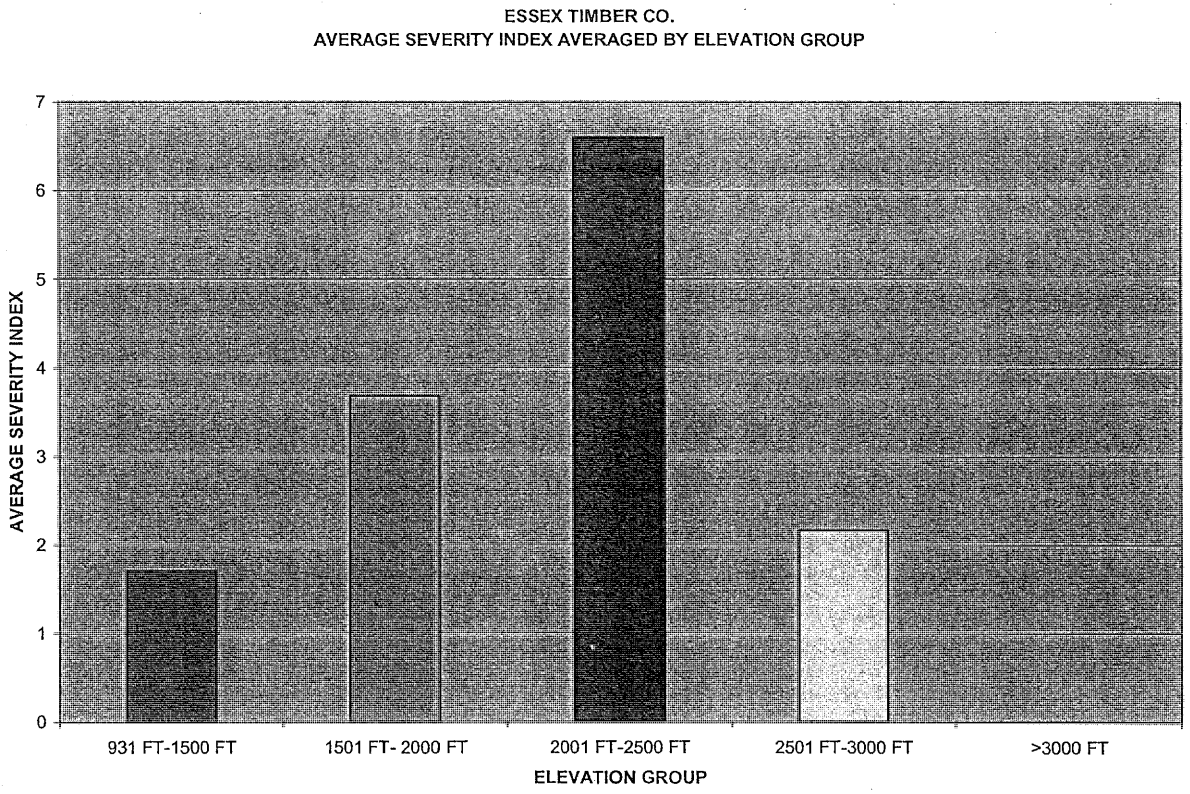
When one looks at this table the data has a bit of "static" in it so that it does not demonstrate an even bell-shaped curve, but as will be seen below when the ETC landscape is divided into elevation groups and the data collected is distributed on average across the 5 selected groupings the data does demonstrate a correlation to elevation.



This chart summarizes the data shown in the previous chart into groups to more clearly demonstrate the elevation bias of the impacts moose are having on the lands of ETC.



This chart combines the severity index with the elevational data to demonstrate that not only is the browsing concentrated at the 2000-2500 foot band, but so are the severe impacts of browsing. We also believe from our observations that the identification of less general damage and less measured severe browsing at high elevations may in fact be related to historical trends and accumulated damage resulting in the absence of regeneration in those areas. Therefore, there is a lack of opportunities to observe recent browse or even relatively established browsing evidence. In some of these historical winter yards heavy browsing goes back decades and has removed the understory as a viable source of browse for the moose. We have seen a migration of moose down the mountainsides from traditional high elevation winter yards to mid slope areas where there is more acreage and a more viable browse source in that elevation range. This has moved the moose damage from a small and economically insignificant component of the forest to the most productive and valuable portion of many forested tracts in this region.



This chart is designed to remove the "static" from the data to better relate the average severity of browse damage to elevation. The important consideration is that by acreage this represents a large component of the property in this most severe browsed condition.

Acreages by elevational group are as follows:

ELEVATION GROUP	ACRES
931 FT-1500 FT	12197.5
1501 FT- 2000 FT	26962.2
2001 FT-2500 FT	36364.4
2501 FT-3000 FT	9918.4
>3000 FT	839.8
TOTAL	86282.3

Inserted here will be the 11/17 format version of the topographic moose severity breakdown map.

SPECIAL TREATMENT AREAS:

The Conservation Easement on the property designates several special treatment areas. These are: Ferdinand Bog South America Pond and Mud Pond (Brunswick) Watersheds; the East Mountain and Willard Mountain old growth areas; the Ferdinand deer wintering area; and the Unknown Pond (Avery's Gore) shoreline/riparian zone buffer. The Conservation Easement also mandates a 50-foot no-harvest buffer zone around blue line streams and major wetland areas. Special considerations for individual special treatment areas can be found on the compartment maps.

At this time, no additional special treatment areas or reserves have been identified. However, it is anticipated that a portion of the land base, particularly high elevation areas (exceeding 2,500 feet in elevation) and excessively steep slopes will be considered.

The management standards for each STA are specified in the conservation easement. The following is a summary of the harvesting and management standards for each area and general forest management guidelines for Special Treatment Areas where management activities can occur.

- Move as quickly as the resource will allow to the implementation of uneven-aged management principles and systems
- Where the Conservation Easement limits openings to less than two acres in size, harvesting will only be implemented through the use of the Group Selection system. In some instances openings of larger than two acres are permissible with prior approval of the easement holder.
- Maintain appropriate no cut or limited access buffers along identified bodies of water and streams within the STA portions of ETC holdings.
- Where strata found on ETC are targeted for regeneration or OSR harvest treatments, these strata will not be treated with the highest priority modeled for locations within the STA. Instead these stands will be treated to develop an overstory over a longer period of time by using small salvage and regeneration treatments not exceeding the 2 acre eased limit.
- To address the ongoing loss of standing timber due to decline, disease and other environmental factors within the STA's, ETC will not preclude the use of salvage harvests, where appropriate even where guidelines require no openings over 2 acres in size. Pre-harvest planning will provide the necessary baseline data, suggested treatments, and desired outcomes where salvage operations are required to deal with timber losses in STA's.
- All thinning will be targeted to utilize individual tree selection wherever possible to maintain the maximum stocking levels conceivable.
- The pre-harvest assessment process will include a more detailed inventory to insure that all items addressed in the CE for a particular STA have been addressed and investigated. In this manner the current stand conditions will be clearly viewed and presented so that the easement holder can be fully informed as to what is on the ground prior to assessing the appropriateness of the suggested forest management treatment to be implemented.
- There needs to be a clear recognition that many acres of the various STA's will be incapable of treatment for the 10 year period of this plan due to the lack of sufficient stocking to allow for the low impact harvest and thinning operations required by the easement.
- Desired outcomes for all entries are always to work toward or retain an uneven-aged stand structure, maximize species diversity, and limit the aesthetic and physical changes to the forest within the STA.
- Extend rotations once the stands are fully stocked to provide for a more continuous forest cover in these areas as well as to target the preferred uneven-aged stand structure for the STA's

Ferdinand Bog and South America Pond Watershed, Ferdinand

Provisions under conservation easement include (Conservation Easement IV (1), p. 8):

- Protection of watershed values given the highest priority in planning and conducting all harvest activity within the STA, and strict compliance with AMPs for timber harvesting,
- No forest management activities within 200 feet of South America Pond,
- Patch cuts, clear cuts, group size shall not exceed 2 acres in area, except as approved by easement holders for the purpose of timber salvage operations,
- All harvesting activities must occur between December 1 and March 31, except as approved by easement holders for purpose of forest regeneration.

Mud Pond Watershed, Brunswick

Provisions under conservation easement include (Conservation Easement, IV (1) p. 8):

- Protection of watershed values given the highest priority in planning and conducting all harvest activity within the STA, and strict compliance with AMPs for timber harvesting,
- No forest management activities within 200 feet of the wetlands associated with Mud Pond and Dennis Pond, including no non-harvesting disturbance of existing flora and fauna, or other physical alteration,
- Patch cuts, clear cuts, group size shall not exceed 2 acres in area, except as approved by easement holders for the purpose of timber salvage operations,
- All harvesting activities must occur between December 1 and March 31, except as approved by easement holders for the purpose of forest regeneration.

Ferdinand Deer Wintering Area, Ferdinand

This deer wintering area is a part of the larger 12,000 acre Nulhegan Basin deer wintering area that includes Vermont's Wenlock Wildlife Management Area. Within this special treatment area, all forest management activities shall be conducted in accordance with the "1990 Management Guide for Deer Wintering Areas in Vermont," published by the Vermont Department of Forests, Parks & Recreation and the Vermont Department of Fish & Wildlife. General considerations for this area as a whole will include:

- Using area regulation to ensure that at least 50% of the softwood stands within the wintering area provide functional shelter,
- Using an uneven aged managed system over the whole, by groups,
- Including travel corridors in harvest layout to ensure uninterrupted deer mobility and access by deer through the wintering area,
- Encouraging softwood regeneration and management in mixed wood types within the wintering area, where site conditions permit.

It is important to note that the Ferdinand Deer Wintering Area will be treated as outlined and modeled by strata for the stands located in that STA, except were modifications are deemed appropriate to satisfy the management guide for deer wintering areas.

The following Special Treatment areas are reserves where no management activities are allowed. No management strategies are planned outside of periodic visits to observe ongoing natural processes.

East Mountain Old Growth Area, East Haven

This stand is an example of an original montane spruce-fir forest, which contains spruce trees over 260 years old. Provisions under conservation easement include (Conservation Easement, IV (3) p. 9):

- No forest management activities, operation of any mechanized or motorized equipment, or physical alteration of the ground surface.

- No manipulation of natural watercourses, marshes, or other water bodies, or engage in other activities which would be detrimental to water purity, or which could alter natural water level or flow,

Mud Pond, East Haven

A remote, pristine, soft water pond and associated wetlands, surrounded by an undisturbed buffer of spruce-fir forest. Special protection provided under easement as an important surface water, with a required 50-foot buffer. For the purposes of this plan, the buffer shall be a minimum of 100 feet.

Seneca Mountain Bog, Ferdinand

This is a high elevation, pristine bog with a completely intact buffer. This includes a high quality poor fen natural community, part of which is an unusual sedge and liverwort flat. Special protection provided under easement as an important surface water, with a required 50-foot buffer. For the purposes of this plan, the buffer shall be a minimum of 100 feet.

Unknown Pond, Avery's Gore

This pond is a deep, remote coldwater pond with high dissolved oxygen content and a shoreline population of bog aster. This pond has also been identified as a potential loon nesting site. Provisions under conservation easement include (Conservation Easement, IV (3) p. 9):

- No forest management activities, operation of any mechanized or motorized equipment, or physical alteration of the ground surface within 200 feet of the shoreline,

- No manipulation of natural watercourses, marshes, or other water bodies, or engage in other activities which would be detrimental to water purity, or which could alter natural water level or flow,

- The existing road situated within the 200-foot buffer zone, located on the southwest side of the pond, may be utilized provided erosion is controlled using all erosion control devices and strict adherence to AMPs.

Willard Mountain Old Growth Area, Brunswick

This area contains two small stands of native red pine that are approximately 170 years old. Provisions under conservation easement include (Conservation Easement, IV (3) p. 9):

- No forest management activities, operation of any mechanized or motorized equipment, or physical alteration of the ground surface.

- No manipulation of natural watercourses, marshes, or other water bodies, or engage in other activities which would be detrimental to water purity, or which could alter natural water level or flow,

Areas over 2500 feet in elevation

With over 10,000 acres in commercial forestland over 2500 feet ETC will be moving into a more active program of operating under Act 250 permitting as required for forest management above this elevation. The stands of Strata located above 2500 feet will be carefully assessed and the pre-harvest assessment process will include a more detailed inventory. In this manner the current stand conditions will be clearly viewed and presented to make certain that all factors related to Act 250 compliance are addressed. General considerations for these areas as a whole will include:

- Increased retention of large live cull and cavity trees
- Harvest planning and layout will occur during snow free conditions
- Access will be carefully considered with the location of haul roads and landings at lower elevations preferred
- Winter harvesting will be the preferred timing except in cases where ground conditions permit summer harvests and scarification for regeneration is desirable
- Whole tree harvesting will be avoided to the greatest extent possible, with hardwood tops and softwood limbs remaining in the stand
- Streams, wetlands, and other sensitive sites will be avoided and buffered wherever possible.

Many of these recommendations are made in the publication *Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire.* It is important to note the publication refers to high elevation forests as those areas over 2700 feet in elevation.

BIOLOGICAL DIVERSITY

By design, the Champion Lands sale limited the overall biological diversity on the Essex Timber Company property by placing lands with high regional biodiversity values under public ownership. Most of the ETC ownership lies between 1,000 and 2,500 feet in elevation, consisting of mid slope hardwood types dominated by sugar maple and yellow birch. Sites recognized as significant natural areas are designated in the Conservation Easement as Special Treatment Areas (see Special Treatment / Reserve Areas).

Much of this ownership has seen harvesting over the last 20 years, and substantial acreage has been heavily cut. Even-aged management techniques were used extensively. Today, approximately 13% of the ownership is in regeneration and sapling stands. The most common forest type on the property is northern hardwood or other hardwood mix. This type covers approximately 56 % percent of the land area. Mixed wood types, the majority of which have greater than 50% hardwood stocking, cover approximately

33% of the area. The spruce and fir type is limited to 5% percent of the land area. The remaining 6% includes roads, stream buffers, yards, landings, and other reserves.

Though the property is lacking in its diversity of forest types, it is surrounded by many of the types lacking within it. These include open water and wetland complexes associated with the nearby lakes, softwood stands in the bottomland areas of the lakes and major drainages, including the Nulhegan Basin, and early successional/old agricultural types associated with human influences around the property's perimeter, including the Connecticut River Valley.

Future management practices, as controlled by landowner goals and objectives, will increase the diversity over the parcel as a whole. Practices such as retaining and promoting softwood inclusions, retaining American beech and other mast producing stems, and promoting pockets of aspen as an early successional component will enhance diversity (see also Wildlife and Wildlife Habitat). Improving size class distribution is another important goal. Within stands this can be accomplished by converting existing even aged stands with adequate stocking and structure to uneven aged stands using individual tree selection harvests, and treating other stands on a group selection basis.

NON-TIMBER FOREST PRODUCTS

Essex Timber recognizes that non-timber forest products (NTFPs) are an essential element in sustainable forestry. As discussed in a report for the John D. and Catherine T. MacArthur Foundation (Best and Jenkins, 1999):

> "Our analysis suggests that a sustainable forestry enterprise can succeed in monetizing non-timber forest values through one or a combination of [non-timber forest products], enhancing the competitiveness of sustainable forestry or making up any incremental difference in profitability there may be as compared to conventional forestry."

The authors cite traditional plant-derived NTFPs, but also include non-traditional NTFPs such as carbon sequestration and watershed services.

Essex considers its recreational leases and any other source of lease income as an NTFP. Revenue derived from such non-timber sources enhances timber management in the following ways:

- It reduces the pressure to harvest a given volume for the purpose of covering annual management, overhead and tax costs.
- It enables Essex to execute a greater percentage of its harvests during the winter months.
- It enables Essex to place silvicultural considerations first in its timber management decision-making.

All of these aid Essex in achieving its first Forest Management Objective, which is to return the timber resource to a well-stocked condition.

Essex Timber intends to continue its camp lease program, including those leases which it is under no obligation to renew. Essex Timber will evaluate new NTFP opportunities as they arise. Provided that such use of NTFPs facilitate the economically sustainable production of forest resources as described above, and minimize any negative impact on surface water quality, recreational benefits to the public, wildlife habitat, and other conservation values, they will be given serious consideration.

Use Value Appraisal Forest Management Plan Signature Page For the Lands of Plum Creek Maine Timberlands, LLC

The prior owner of the now Plum Creek Maine Timberlands, LLC lands in Essex and Caledonia Counties, Essex Timber Co., LLC, elected to utilize an alternative planning strategy to continue eligibility for Vermont's Use Value Appraisal program. The Use Value Appraisal Large Landowner Alternative Forest Management Plan Format is available for interested landowners with enrolled contiguous blocks of forestland 5,000 acres and larger. This planning format requires that eligible landowners submit a "10-year concept" plan to the Department of Forest, Parks & Recreation which would include the following components:

1. Map to standards with stands delineated and stand numbers assigned (as with all UVA plans)
2. For each broad forest cover type described from the stratified random sample:
    a. Corresponding UVA type
    b. Acreage
    c. Forest Cover Type description
    d. Management recommendations including area regulation scheme. Silvicultural prescriptions to be employed and a description of stand conditions for which each prescription will be utilized

All individual stands are considered to have "no activity" under this conceptual plan. When an entry or harvest or other activity is planned, the landowner will submit an amendment for approval. Approval must be received prior to commencement of harvest activities.

The amendment document will include stand specific information from a pre-sale cruise and meet all of the *minimum standards for forest management* as described in the UVA Program Manual effective April 15, 2006. This includes copies of maps with stands clearly delineated.

Activity plan amendments will be accepted for review twice a year: For fall/winter harvests by August 1, for summer harvests by April 1.

Managers should plan harvests for a year on any given block in which an amendment is submitted.

Harvesting and other activities that take place without the signed amendment from the County Forester will be considered in nonconformance with the filed UVA plan.

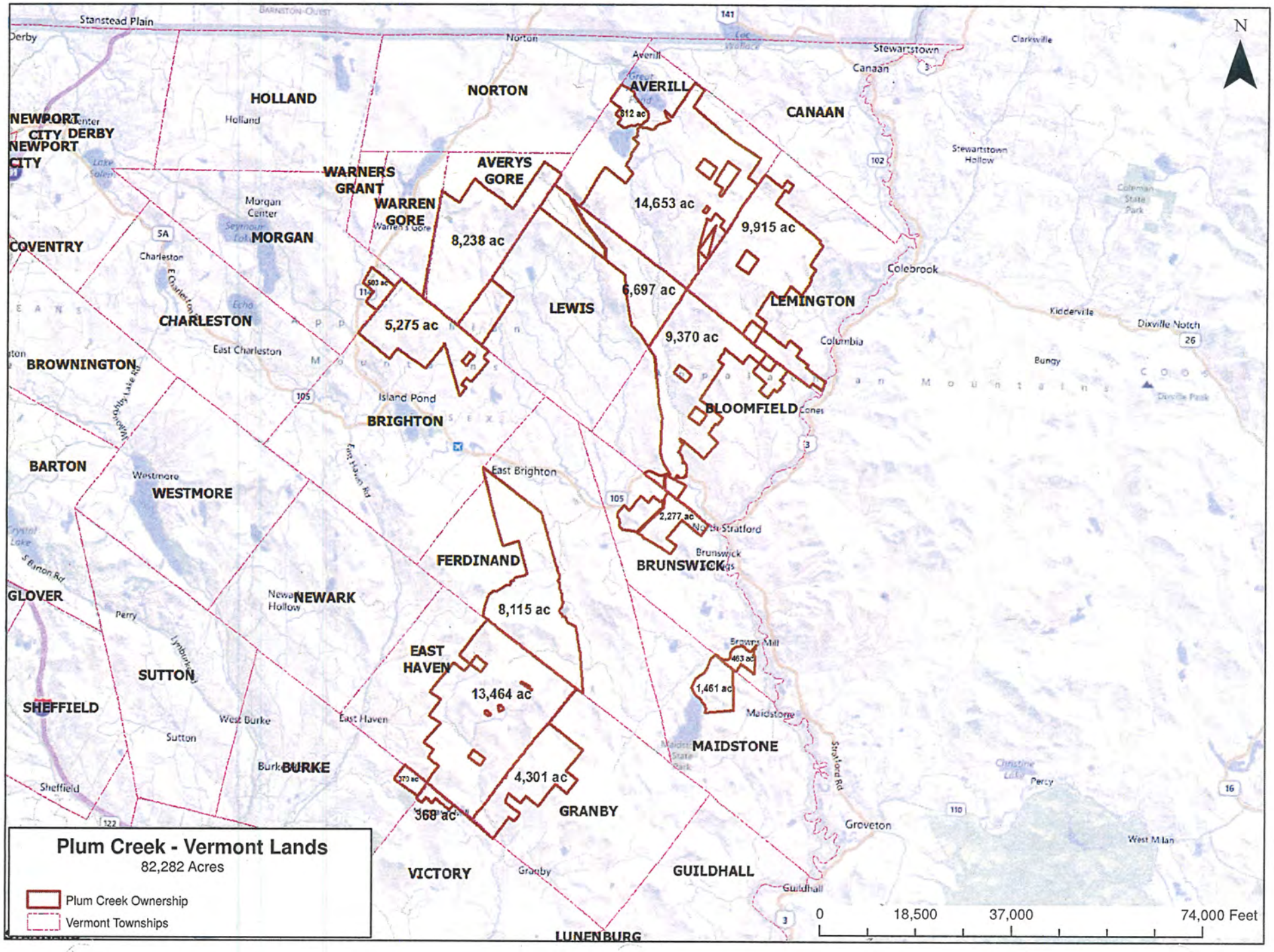
The schedule and requirements for the plan Conformance Inspection Reports (CIR's) any plan updates, other amendments or reporting changes are not affected by this procedure.
Entry plans will cite both total and acceptable growing stock (AGS) residual Basal Areas as well as quadratic mean stand diameter (MSD) along with the appropriate Silvicultural Guides.

Signatures:
I certify that this signature page constitutes an addendum to my forest management plan. By signing below I have elected to adopt the plan developed by the Essex Timber Co., LLC and understand and agree to the above requirements of the Use Value Appraisal Large Landowner Alternative Forest Management Plan Strategy for continued eligibility in UVA.

Signature: *Timothy E. Dorrell*   *10-15-08*
Date

Tim Dorrell
Senior Resource Manager
Plum Creek Maine Timberlands, LLC

Approved: *[signature]*   *11-7-08*


Plum Creek - Vermont Lands
82,282 Acres
Plum Creek Ownership
Vermont Townships
N
0
18,500
37,000
74,000 Feet
AVERILL
CANAAN
NORTON
HOLLAND
NEWPORT CITY
NEWPORT CITY DERBY
WARNERS GRANT
AVERYS GORE
WARREN GORE
MORGAN
COVENTRY
CHARLESTON
BROWNINGTON
BARTON
WESTMORE
GLOVER
SUTTON
SHEFFIELD
BURKE
NEWARK
BRIGHTON
LEWIS
FERDINAND
EAST HAVEN
VICTORY
GRANBY
LUNENBURG
GUILDHALL
MAIDSTONE
BRUNSWICK
BLOOMFIELD
LEMINGTON
312 ac
14,653 ac
9,915 ac
8,238 ac
6,697 ac
5,275 ac
9,370 ac
2,277 ac
8,115 ac
13,464 ac
4,301 ac
368 ac
463 ac
1,461 ac