



Landscape-Based Forest Stewardship A Regional Approach

Solid unbroken forest is all around me, stretching far beyond my vision, for hundreds of miles. It is one of the few such forests remaining in the world. The forest regulates the water flow from the frequent heavy rains. It prevents floods, providing steady runoff into the trout-filled streams. It used to support salmon runs. Such a forest is also the diffuse lung tissue of the earth to which we are irrevocably bound. It is not our “environment.” It is us.

“The Trees in My Forest,” Bernd Heinrich, 1997

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Thanks to all the members of the **Regional Steering Committees**, who attended many nighttime meetings and worked tirelessly towards the completion of this project. Their vision was inspiring, their input and efforts were invaluable and helped to make this project successful.

Thanks to the four **Regional Planning Commissions** – Addison, Bennington, Lamoille and Two Rivers-Ottauquechee – for their dedication and hard work on this pilot project. Through their efforts a solid foundation has been established for other regions to follow and expand on.

Thanks to the **State and Federal Partners on the Coordinating Committee** for contributing their efforts to this project: Steve Sinclair, Ginger Anderson, Nancy Patch, Ray Toolan, Jon Bouton, Chris Olson, Chris Stone, Erik Engstrom, and Roger Monthey.

The **Vermont Natural Resources Council** made valuable contributions to this project in consultations with the Regional Planning Commissions and by allowing us to use their Conservation Strategies Matrix in the regional reports.

Finally, we would like to acknowledge the **United States Department of Agriculture Forest Service** for their generous financial support of this project.



Vermont Regional Planning Commissions

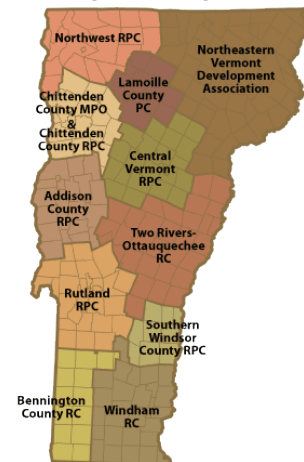


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Executive Summary

According to the Vermont Forest Resource Fact Sheet, more than 70-percent of Vermont's 4.6 million acres of forest can be characterized as nonindustrial private forest land (NPIF). This land is divided among an estimated 88,000 landowners, independently managing their properties with unique private interests.¹ The fragmented nature of Vermont's NPIF ownership means that forest resource planning occurs parcel by parcel, while more integrated planning would better address the State's objective of keeping forest land intact to maintain habitat connectivity, forest health and productivity, ecosystem quality and strong forest products based economic activities. A landscape stewardship approach was identified as the most effective way to address these concerns and help communities and private landowners conserve forest resource values. Regional forest stewardship planning will help ensure Vermont's public and privately owned forests are managed in an environmentally responsible way.

This project, *Landscape-Based Forest Stewardship Planning - A Regional Approach*, developed a methodology for forest planning based on a landscape-scale analysis, in order to increase the scale and pace of sustainable management of private forest lands in Vermont, with the ultimate goal of keeping forests as forests. This project was a collaboration between the Vermont Division of Forests and four Vermont regional planning commissions to apply a single system – using geographic information system (GIS) technology and a stakeholder engagement process – to inventory and assess forest resources, identify specific forest landscape types, and produce strategies for each landscape type that will assist regions, municipalities, and forest landowners in the objective of keeping forests as forests. The Regional Planning Commissions involved in the project were Addison, Bennington, Lamoille and Two Rivers-Ottauquechee; Lamoille County Planning Commission was responsible for the overall coordination of the project.

The 2010 Vermont State Assessment and Resource Strategies findings completed by the Division of Forests were combined with research conducted in Vermont utilizing forest block and ecological landscape unit analysis and existing GIS data to provide a consistent approach to a regional forest planning. Large rural forest blocks, large and small lowland forest tracts, urban and community forests, and ecologically significant landscape types formed the basis for the analysis. The objective was to identify landscape types in each region, initiate a stakeholder engagement process aimed at identifying priority forest landscapes and issues, and develop model forest plans for use by municipalities and landowners.

Each region produced maps that characterize the forest resources in their areas and, based on an analysis of that spatial data, developed descriptions of forest landscape types that provided the basis for subsequent planning. The following GIS layers were used to help characterize significant forest landscapes: land cover, elevation, soil productivity, water resources (e.g., streams, rivers, headwaters,

¹ Vermont Department of Forests, Parks and Recreation, "Vermont Forest Resource Fact Sheet." Accessed 2012 at: http://www.na.fs.fed.us/ra/factsheets/vt_brief.pdf

lakes, ponds, wetlands, groundwater protection areas), wildlife habitats, rare and endangered species sites, unique natural areas, roads, recreation areas, sites, and trails, regional and town land use districts, conserved lands, and Use Value Appraisal parcels where available. In addition, layers derived from recent landscape-scale forest research in Vermont were used to help evaluate and delineate priority forest landscapes. Landscape types covered a range of conditions from large tracts of remote and mountain forest to large and small lowland forest tracts, as well as urban and community forests, and ecologically significant forest landscapes.

To effectively represent the interests of all involved parties, this project required collaboration between federal, state, local, and private entities. Four regional stakeholder groups were established to guide local efforts. Stakeholder participants included county foresters, state lands specialists, private forest landowners, consulting foresters, local officials, representatives of forest product industries, environmental/conservation groups, and the Green Mountain National Forest. Each region convened a series of public/stakeholder work sessions to review and discuss the forest landscape maps and data and to identify issues relevant to each. Additionally, staff from all four Regional Planning Commissions came together regularly to discuss progress and address issues and challenges as they arose, and regular meetings were held with the Regional Planning Commissions, state and federal partners to facilitate overall coordination of the project.

The project resulted in regional, landscape-scale forest stewardship plans that will be used by the Division of Forests, local decision makers and forest landowners to support sustainable forests and will increase the scale and pace of sustainable management of private forest lands in Vermont. The following outcomes were accomplished:

- 1) Develop and test a GIS-based methodology for forest planning based on a landscape-scale;*
- 2) Engage local and regional stakeholders in the process to insure local issues are addressed;*
- 3) Identify strategies and develop tools for regions, municipalities, and forest landowners to keep forests as forests;*
- 4) Develop a process that can be replicated across regions and landscape scales;*
- 5) Model a collaborative process across regions and agencies for forest stewardship planning.*

Many issues identified through the geographic analysis and stakeholder engagement process were universal among the four regions: forests are valued for their ecological, economic, recreational, scenic and cultural richness; forest resources are threatened by increasing fragmentation, unfavorable economic conditions, and environmental factors such as climate change, invasive species and disease. Yet, contrasts were revealed between the four regions with respect to landscape types, economic and demographic conditions, and cultural/social values that resulted in priorities and strategies unique to each region. The resulting Forest Landscape Stewardship Plans reflect regional priorities and set the stage for future implementation of regional forest stewardship projects. Consequentially, the outcome of this effort should not be considered an end in itself, but a means toward the overall goal of achieving landscape forest stewardship in these four regions and beyond.

Introduction

Today, nearly 75-80% of the Vermont landscape is forested. These forest lands have been important to the historical development of the area, continue to provide important resources today, and will be critical assets in the development of prosperous and sustainable communities in the future. Comprehensive plans developed by municipalities and by Vermont's Regional Planning Commissions have generally included a discussion of forests in one section of a chapter dealing with a variety of natural resources. Because of the extent of forests in our region, and because of their pervasive significance in all aspects of the daily lives and economic vitality of the region, a more thorough "landscape stewardship" approach to forest resource planning is warranted. Landscape stewardship forest planning combines several key factors to create a comprehensive understanding of resources while developing strategies that will help to achieve the goal of "keeping forests as forests."

One key factor is to recognize that forests exist in a variety of different landscape settings. The vast unbroken forest tracts that cover our ridgelines and the rugged and roadless landscapes of our Mountain Ranges represent a common perception of Vermont's forests. At the same time, the patchwork of forest blocks that are interspersed with farmland in rural valleys and the smaller woodlots and forested parcels in and around village and town centers represent significant forest resources that may provide different values and require different management and conservation strategies. Another critical component to landscape forest stewardship planning is to recognize that there are a variety of interest groups and viewpoints that have a stake in the region's forests. An effective planning process must involve those stakeholders and incorporate the diversity of values represented. Once the forest landscape is understood and values clearly described, a set of strategies designed to protect and enhance the resources that serve those values must be developed.

Examples of Landscape Forest Planning

Forestland Evaluation and Site Assessment (FLESA)

One of the earliest examples of a planning model using geographic information was developed during the 1990's by natural resource professionals to help address concerns over increasing pressure on forest resources and incorporate them into community planning. Referred to as the Forestland Evaluation and Site Assessment (FLESA) process, its purpose was to aid cities, towns, and others plan for future development and natural resource needs, with careful consideration for what currently and could potentially exist. Specifically, FLESA was developed to help inventory forest based resources, and assess commercial timberland, wildlife habitat, recreational use, and scenic resources. Public participation was integral in the process to fairly and objectively establish a ranking system for inventoried parcels.² Geographic data available today allows for an improved region-wide resource assessment within the context of the area's unique landscapes. This current stewardship plan utilizes state of the art

² North Country and Southern New Hampshire Resource Conservation and Development Area Councils, 2001. New Hampshire Forestland Evaluation and Site Assessment Committee. Planning for the Future of Local Forests: A Guide for New Hampshire Towns. Accessed 2012 at <http://www.nh.nrcs.usda.gov/technical/Publications/FLESAmanual.pdf>

geographic information systems, giving regional planners, local officials and private landowners information and strategies that will help improve the long-term viability of important forests and forest-based resources.

Forest Legacy Program and Assessment of Need (AON)

Forest Legacy Program and Assessment of Need (AON) is the foundation that this project builds upon. The federal Forest Legacy (16 U.S.C. Sec. 2103c) program was part of the 1990 Federal Farm Bill. The program acknowledges that most forested lands in the United States are held in private ownership and that those landowners are facing growing financial pressure to convert those lands to uses that would remove them from the forested land base. Much of this pressure arises from the demand for residential and commercial development. The Forest Legacy Program (FLP) is a federal grant program to protect forestlands from conversion to non-forest uses. The goal of the FLP is *“to maintain forestlands at risk for conversion to other uses primarily through the use of conservation easements with willing owners. The overall purpose of the program is to sustain the economic, ecological, and social values of forests, including productive working forests; habitats and natural communities that promote native plants and wildlife; clean water and fish habitat; public recreational opportunities including fishing and hunting; culturally significant resources; and scenic landscapes.”*³

The Assessment of Need (AON) is a process whereby each state defines environmentally important areas, determines the threats to its forests, and develops its own criteria for selecting areas of the state that are most important, referred to as Forest Legacy Areas (FLA). Based upon public input solicited and received, the state refines its selection of FLAs and seeks approval of these Forest Legacy Areas from the Secretary of Agriculture.⁴ Vermont updated its AON in 2010.

Shifting the Focus from Statewide to Regional

While the AON focus is statewide, the regional forest stewardship plans focus at a regional level. The purpose of a regional forest stewardship plan is likewise to define priority areas based on regional assets, values and threats to those values. It builds upon the goals of Forest Legacy Program to conserve large blocks of forest land to include all important forests regardless of size, recognizing that even small forested areas can serve valuable functions. In short, the goal of Forest Stewardship is to “sustain the health, productivity, and diversity of the Nation’s privately owned forest land to help meet the needs of current and future generations.”⁵

According to the Vermont Forest Resource Fact Sheet, more than 70-percent of Vermont’s 4.6 million acres of forest can be characterized as nonindustrial private forest land (NPIF). This land is divided among an estimated 88,000 landowners, independently managing their properties with unique private

³ Vermont Department of Forests, Park and Recreation, 2001. Vermont Forest Legacy Program. Accessed 2012 at <http://www.vtfpr.org/lands/flp.cfm>.

⁴ Vermont Department of Forests, Park and Recreation, 2010. State of Vermont Forest Legacy Program Assessment of Need. Accessed 2012 at <http://www.vtfpr.org/lands/flp.cfm>.

⁵ Landscape Stewardship Project, A Quick-Start Guide for Forest Stewardship Program Managers, 2011. Northeastern Area Association of State Foresters, USDA Forest Service Northeastern Area State and Private Forestry. Accessed 2012 at na.fs.fed.us/pubs/stewardship/quick.../quick_start_guide_print.pdf.

interests⁶. The fragmented nature of Vermont's NPIF ownership means that forest resource planning occurs parcel by parcel, while more integrated planning would better address the State's objective of keeping forest land intact to maintain habitat connectivity, forest health and productivity, ecosystem quality and strong forest products based economic activities. A landscape stewardship approach was identified as the most effective way to address these concerns and help communities and private landowners conserve forest resource values. Regional forest stewardship planning will help ensure Vermont's public and privately owned forests are managed in an environmentally responsible way.

A crucial element in developing a regional forest stewardship plan is to solicit and receive input from the public. The Landscape Stewardship Guide (2011) defines landscape stewardship as an effort to bring together stakeholders in a "Community of Place," a municipality, county or other geopolitical unit, or a "Community of Interest," a collaboration of individuals or organizations with a shared interest in a specific issue, to address common interests or concerns regarding resource-based issues.⁷ Landscape stewardship is a process that engages landowners in the management of resources. In turn, engaged landowners are more likely to make informed decisions that will result in sound and sustainable management of forest resources.

A landscape stewardship project is divided into four phases: Planning, Coordination, Implementation, and Monitoring and Evaluation. This project focused on the first two phases –planning and coordination. 1) Planning involves the development of a common vision and desired future conditions, developing goals and steps to achieve those goals; 2) coordination involves building relationships, fostering new partnerships, initiating outreach and allocating responsibilities among the partners. The process of a landscape forest stewardship project is to:

- *prepare an assessment of current conditions and trends (ecological, social, and economic) in the landscape;*
- *determine vision, goals, and issues that address existing and potential conditions considered desirable for the region;*
- *develop strategies for implementing the vision and goals, and resolve issues in the region;*
- *encourage voluntary implementation of the strategies by coordination among landowners; and*
- *conduct an evaluation to determine how well the strategies accomplish the vision and goals and resolve issues⁸*

In the development of the Forest Landscape Stewardship Plans, the first three objectives were accomplished, thereby setting the stage for future implementation of regional forest stewardship projects. Consequentially, the outcome of this effort should not be considered an end in itself, but a means toward the overall goal of achieving landscape forest stewardship in these four regions and beyond.

⁶ Vermont Department of Forests, Parks, and Recreation, 2010. "Vermont Forest Resource Fact Sheet," Accessed 2012 at http://www.na.fs.fed.us/ra/factsheets/vt_brief.pdf

⁷ Landscape Stewardship Guide, 2011. Northeastern Area Association of State Foresters, USDA Forest Service Northeastern Area State and Private Forestry. Accessed 2012 at www.na.fs.fed.us.

⁸ Landscape Stewardship Guide, 2011.

Methods

Landscape-Based Forest Stewardship Planning - A Regional Approach, developed a methodology for forest planning based on a landscape-scale analysis, in order to increase the scale and pace of sustainable management of private forest lands in Vermont, with the ultimate goal of keeping forests as forests. This project was a collaboration between the Vermont Division of Forests and four Vermont regional planning commissions to apply a single system – using geographic information system (GIS) technology and a stakeholder engagement process – to inventory and assess forest resources, identify specific forest landscape types, and produce strategies for each landscape type that will assist regions, municipalities, and forest landowners in the objective of keeping forests as forests. To effectively represent the interests of all involved parties, this project required collaboration between federal, state, local, and private entities.

Eleven regional planning commissions serve the State of Vermont and much of the land use, environmental, and economic development planning in Vermont occurs at this level. In the past, forest resource planning has not always been carried out at the most effective scale. This project developed a methodology that can be used by regional planning commissions and similar organizations to conduct landscape-scale forest stewardship planning. This geographical context was integrated with strong stakeholder engagement to develop effective and financially viable conservation strategies that can also be used at the municipal or parcel level.

The 2010 Vermont State Assessment and Resource Strategies completed by the Division of Forests was combined with research conducted in Vermont utilizing forest block and ecological landscape unit analysis and existing GIS data to provide a consistent approach to a regional forest landscape-scale analysis. Large rural forest blocks, large and small lowland forest tracts, urban and community forests, and ecologically significant landscape types formed the basis for the analysis. The objective was to identify landscape types in each region, initiate a stakeholder engagement process aimed at identifying priority forest landscapes and issues, and develop model forest plans for use by municipalities and landowners.

Each regional planning commission operates a full GIS service center and has access to, and the ability to develop, necessary data. Each region produced maps that characterize the forest resources in their areas and, based on an analysis of that spatial data, developed descriptions of forest landscape types that provided the basis for subsequent planning. The following GIS layers were used to help characterize significant forest landscapes: land cover, elevation, soil productivity, water resources (e.g., streams, rivers, headwaters, lakes, ponds, wetlands, groundwater protection areas), wildlife habitats, rare and endangered species sites, unique natural areas, roads, recreation sites and trails, regional and town land use districts, and parcels (including public and conserved lands as well as parcels in the state's Use-Value Appraisal program, some of which required additional electronic data development). In addition, layers derived from recent landscape-scale forest research in Vermont were used to help organize and

evaluate the data; that research provided useful information detailing a variety of forest/habitat blocks and ecological landscape units. Landscape types covered a range of conditions from large tracts of remote and mountain forest to large and small lowland forest tracts, as well as urban and community forests, and ecologically significant forest landscapes.

Each Regional Planning Commission produced the following series of maps, shown in Appendix A-D, depicting forest attributes:

1) Biophysical Regions and Land Cover

This map includes a Biophysical Regions⁹ layer that divides Vermont into eight sub-regions on the basis of bedrock geology, gross physiography, climate, and broad-scale patterns of potential natural vegetation. These biophysical regions are used to analyze patterns of biodiversity in Vermont, which is an important component of regional-scale conservation planning. The second layer included is a Land Cover layer derived from the National Land Cover 2006 dataset.¹⁰ The Multi-resolution Land Cover Characteristics Consortium (MRLC), working in collaboration with the National Oceanic and Atmospheric Administration (NOAA) Coastal Change Analysis Program (CCAP), first produced this land cover dataset in 1992. The most recent update from 2006 was used in this map and included the following land cover classes:

Developed, Open Space	Shrub/Scrub
Developed, Low Intensity	Grassland/Herbaceous
Developed, Medium Intensity	Pasture Hay
Developed, High Intensity	Cultivated Crops
Barren Land	Woody Wetlands
Deciduous Forest	Emergent Herbaceous
Evergreen Forest	Open Water
Mixed Forest	

2) Forest Productivity and Timber Resources

This map includes the Forest Productivity layer developed by the Vermont Land Trust for the 2010 Vermont Forest Resource Plan.¹¹ Forest blocks greater than 500 acres were ranked according to their predicted forest productivity as either lower or higher productivity, based on the following inputs – geology (30%), elevation (25%), hardiness zones (15 %), landforms (15%), slope (10%) and precipitation (5%). For this map datasets were developed from locations of forest producers (Christmas tree farms, maple sugaring operations and sawmills) in each region and shown as points.

⁹ Engstrom 2010; David Capen, University of Vermont and Phil Girton, Vermont Department of Forests, Parks and Recreation, 1998.

¹⁰ National Land Cover Data, Multi-resolution Land Cover Characteristics Consortium, United States Department of Environmental Protection, 2006.

¹¹ Forest Productivity from Vermont Forest Resource Plan, developed by Jon Osborne, Vermont Land Trust, 2009.

3) Habitat Blocks

The Vermont Department of Fish and Wildlife conducted a statewide analysis to delineate and assess the quality of wildlife habitat. Habitat blocks were delineated by selecting blocks of forest from land cover data, and subsequently evaluated using 11 factors to assess their ecological value. Factors considered included cost distance to core areas, ELU weighted acreage, element occurrence count, percent core, block size, road density, percent ponds, percent wetlands, exemplary aquatic features, density of rivers and streams, and percent of block within a TNC matrix block. All these factors were combined to calculate a weighted score for each habitat block.¹²

4) Ecological Resources

This map displays the ecological resources of each region using the Habitat Blocks layer along with other data obtained from the Vermont Department of Fish and Wildlife. Modeled wildlife habitat blocks are shown, ranked from low to high suitability, as well as locations of deer wintering yards, bear feeding areas and individual occurrences of bear and moose road crossings/mortalities.

5) Recreational and Scenic Resources

This is a map of recreational sites, trails, conserved lands and town forests, with forested land in the background.

6) Water Resources

This map shows surface water (lakes/ponds and streams) with priority aquatic features highlighted, wetlands, ground and surface water source protection areas, flood and fluvial erosion hazard areas, and conserved lands. Watershed boundaries are shown in the background.

7) Conserved Lands and Use-Value Appraisal Parcels

This map shows parcels enrolled in the Vermont Use Value Appraisal (UVA) program with conserved lands in the background. The UVA layer was developed by each RPC as time and budget permitted; note that these datasets are incomplete and in need of updating. The Conserved Lands layer was developed by the Vermont Land Trust.¹³

8) Resource Constraints: Human and Environmental

The Forest Resource Constraints map is depicted by three layers:

- **Areas of Forest Decline:** Areas of forest decline were mapped by the Vermont Agency of Natural Resources. Annual aerial surveys were conducted to visually estimate areas

¹² Jens Hilke, Vermont Department of Fish and Wildlife (VDFW), Eric Sorenson, Vermont Agency of Natural Resources (VANR), Jon Osborne, Vermont Land Trust (VLT), 2009.

¹³ Conserved Lands from Vermont Forest Resource Plan, developed by Jon Osborne, Vermont Land Trust, 2009.

of defoliation and dead or dying trees, and polygons of dead trees and high dieback were subsequently mapped as areas of decline.¹⁴

- **Forest Sensitivity to Acid Deposition:** Forest health and productivity are dependent on soil fertility, which can be compromised due to acid deposition leaching. Sensitivity to acid deposition was modeled by calculating the exceedance of atmospheric deposition of sulfur and nitrogen over the critical load - the level of deposition above which harmful ecological effects occur in a forest ecosystem.¹⁵
- **Housing Density:** This layer was developed by calculating building density from Vermont ESITE data using a kernel density search radius of 1/2 mile and classifications as follows: undeveloped = 0 units per acre, rural = 0-0.025 units per acre, exurban = 0.025 – 0.1 units per acre and urban = 1+ units per acre.¹⁶

9) Forest Stewardship Potential

This map was developed as a product of the Vermont Forest Stewardship Spatial Analysis Project (SAP) to determine the potential for stewardship of private forest lands in Vermont. Spatial data were used to indicate non-industrial private forest lands where stewardship could be encouraged or enhanced. Lands with high stewardship potential are considered priority areas for the Forest Stewardship Program of the USDA as well as for more concentrated conservation, management, and associated planning efforts. This project identified 10 factors that play a key role in influencing suitability for forest stewardship. Factors that threaten forest resources include development (conversion to non-forest uses) and forest health (risk and adaptability to change). Factors that support the potential of forest resources include forest patches, slope, wildlife and biodiversity, riparian corridors, wetlands, priority watersheds, and proximity to publicly-owned lands. Using a raster-based GIS analysis, 30 x 30 meter grid cells were assigned values based on each of the 10 parameters to determine their individual forest stewardship potential or threat. Then the importance of each of these factors was ranked as high, medium or low and the results were combined in a GIS overlay analysis. The final product is a single data layer which represents the suitability of the land for further stewardship efforts.¹⁷

Four regional stakeholder groups were established to guide local efforts. Stakeholder participants included county foresters, state lands specialists, private forest landowners, consulting foresters, local officials, representatives of forest product industries, environmental/conservation groups, and the Green Mountain National Forest. Each region convened a series of public/stakeholder work sessions to review and discuss the forest landscape maps and data and to identify issues relevant to each.

¹⁴ Areas of Forest Decline, developed by Barbara Burns and Eric Engstrom, Agency of Natural Resources, 2010.

¹⁵ Sensitivity to Acid Deposition, developed by Engstrom & Wilmot, Vermont Agency of Natural Resources, 2010 from Eric Miller, Ecosystems-Research, Inc., 2005.

¹⁶ Housing Density, developed by Kevin Behm, Addison County Regional Planning Commission, 2011.

¹⁷ Vermont Dept of Forests, Parks, and Recreation. (2007). Vermont Methodology, September 2007. Forest Stewardship Analysis Project [unpublished]. Retrieved 2011, from <http://www.fs.fed.us/na/sap/products/VT/VT-Methodology.pdf>.

The project resulted in regional, landscape-scale forest stewardship plans that will be used by the Division of Forests, local decision makers and forest landowners to support sustainable forests and will increase the scale and pace of sustainable management of private forest lands in Vermont. The following outcomes were accomplished:

1) Objective: Develop and test a GIS-based methodology for forest planning based on a landscape-scale

Using a GIS-based methodology, landscape-scale forest stewardship plans were created for each region. The plans mapped forest resources, identified priority forest landscapes, and outlined specific strategies targeted toward each landscape that will promote maintenance of those resources. The plans are intended to be replicable in other regions of the state. Although not a part of this project, it is anticipated that the regional forest plans will be integrated with comprehensive regional plans that are used in the development of policies, stewardship efforts, and economic development initiatives that affect forests at the local, regional, and state levels. These plans identify priority forest landscapes and specific strategies targeted toward each landscape that will promote maintenance of those resources.

2) Objective: Engage local and regional stakeholders in the process to insure local issues are addressed

With frequent public meetings and outreach to stakeholders through other means, each region identified issues and opportunities to include in their plans. Outreach efforts helped target stewardship opportunities that benefit forest landowners and help them manage forests in a sustainable manner.

3) Objective: Identify strategies and develop tools for regions, municipalities, and forest landowners to keep forests as forests

The landscape-scale forest stewardship plans serve as a template for subsequent planning efforts by all of Vermont's regional planning commissions. Those same regional plans also will be used to guide the development of the forest resource sections of municipal plans, ensuring that effective landscape scale planning is reflected in local policies and land use regulations. Model language for use by municipalities and the regions is being developed by the Vermont Natural Resources Council, and will be distributed by the Regional Planning Commissions to their respective municipalities.

4) Objective: Develop a process that can be replicated across regions and landscape scales

Because four regional planning commissions participated in the project, the result is much more robust and replicable than if the work were contained within one organization or one particular region of the state. The plans were specifically designed to serve as models for other planning agencies, and staff and volunteers involved in the project are available to present the plans and discuss the process with other interested parties. The project utilized standard GIS technology and documented stakeholder engagement processes to develop model landscape-scale forest stewardship plans that can be replicated by other planning organizations in any other area.

5) Objective: model a collaborative process across regions and agencies for forest stewardship planning

The project steering committees in each region coordinated efforts through periodic joint meetings which were attended by Northeastern Area (NA) (US Forest Service) and Northeastern Area Association of State Foresters (NAASF) representatives. Input and advice from NA and NAASF workgroups were

incorporated into the project. Information on the project was publicized on regional planning commission websites to facilitate information exchange and comment.

Issues identified through the geographic analysis and stakeholder engagement process were unique to each region, and the systems used flexible enough to be used at a variety of distinct levels - regional, municipal, and parcel specific. The resulting landscape-based forest stewardship plans provide improved baseline data for understanding forests while presenting strategies for conservation that include public-private partnerships and enhancing the economic, ecological and social values of private forestland.

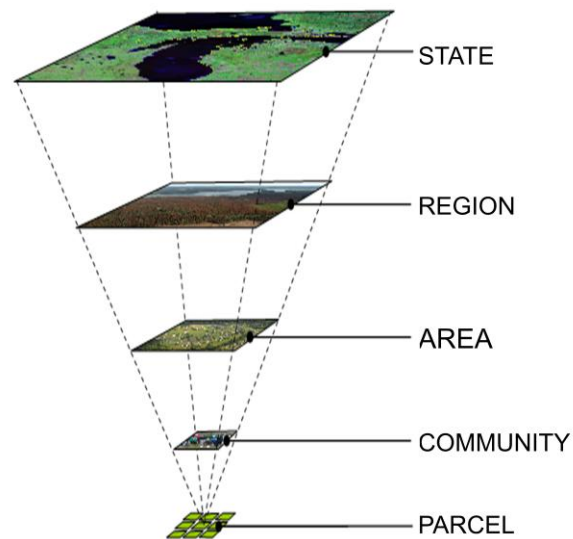


Figure 1: Forest Stewardship plans should have the flexibility to adapt to different scales.¹⁸

¹⁸ Landscape Stewardship Guide, Northeastern Area Association of State Foresters, U.S. Department of Agriculture Forest Service, Northeastern Area State and Private Forestry, 2011.

Regional Forest Stewardship Plans: Commonalities and Differences

Introduction

The four regions that participated in this project, Addison, Bennington, Two-Rivers Ottauquechee and Lamoille represent the diversity of landscape types that characterize Vermont as a whole. While all regions are forested to some degree, the proportion of forested land and the types of forests, shaped by topography, climate, geology and geomorphic processes, are distinct for each region. Each region is shaped by unique demographic, social and economic conditions. Consequentially, the needs and objectives of each region around forest stewardship vary to some degree, and each region tailored strategies to meet their unique needs. The following sections summarize common themes and highlight differences among the four regions with regard to the physical setting, demographic and economic trends, forest resource values, threats to forest resources, and strategies to protect and steward forest resources.

General Physical Setting

Addison

The Addison region (Addison County minus the towns of Hancock and Granville, served by the Two-Rivers Ottauquechee Commission), consists of 21 municipalities and covers 718 square miles in the Champlain Valley. Addison County is bordered to the north by Chittenden County, to the east by Orange County and to the south by Rutland County. It is bounded to the west by Lake Champlain.

Bennington

The Bennington Region (Bennington County minus the towns of Winhall, Searsburg, and Readsboro, which are located in the Windham Region) covers 575 square miles of land and water in southwestern Vermont. There are 13 towns, three incorporated villages, and one unorganized town in the region. Windham County lies to the east and Rutland County to the north, while the region's western border is formed by the New York State line and the southern boundary by the Massachusetts state line.

Lamoille

Comprised of the ten towns and five villages encompassing all of Lamoille County (Belvidere, Town and Village of Cambridge, Eden, Elmore, Town and Village of Hyde Park, Village of Jeffersonville, Town and Village of Johnson, Morristown, Village of Morrisville, Town of Stowe, Waterville, and Wolcott) the Lamoille County Region encompasses approximately 466 square miles in north-central Vermont. The Lamoille region is bordered by the Green Mountain Range including Mt. Mansfield, Vermont's tallest peak at 4,393 to the west and the Worcester Range to the east. The region is also characterized by rolling hills, open valleys, and forested lands. The region is bisected by the Lamoille River from east to west and is uniquely characterized by its borders along Vermont's most urbanized and rural regions,

with urban and suburban Chittenden County to the west, Washington County and the state capital of Montpelier to the southeast, and the rural counties of Franklin, Essex, Orleans, and Caledonia to the northwest and northeast within the Northeast Kingdom.

Two Rivers-Ottauquechee

The Two Rivers-Ottauquechee Regional Commission (TRO) is a compact of thirty municipalities in east-central Vermont. Covering 1,280 square miles in east-central Vermont, This region is bounded by the Green Mountains to the West and the Connecticut River to the east. Unlike the other regions that primarily cover a single county, TRO contains parts of 4 different counties – Orange, Windsor, Addison, and Rutland. Because of this factor, the characterization of forest types and economic analysis of forest resources for the TRO region proved to be challenging, as these metrics are summarized by county rather than by regional planning commission.

Demographic Trends

Populations in most communities, and in Vermont as a whole, rose sharply between the nation's first census in 1791 and the 1850's, after which it remained stagnant for the next 100 years. During this time Vermont's population shifted from the countryside to the city as rural farming communities experienced a sustained period of population decline while urban centers such as Bennington and Springfield underwent a period of population growth. Industry rose as an economic driver, as farms began to die out. New immigrants came to Vermont, attracted by opportunities in the quarries, mills and factories. In effect, from the 1850s through the 1950s, Vermont's population did not stagnate as much as it reorganized from a predominately rural settlement pattern to a more concentrated pattern.¹⁹ Statewide population growth picked up sharply in the 1960's, but has appeared to slow considerably during the last decade.

The four regions' demographic trends have mirrored those of Vermont as a whole. Nevertheless, as illustrated in Table 1, the regions have experienced slightly different growth patterns over the past decade. While the growth rates of Bennington and Two Rivers appear stagnant, Addison and Lamoille continue to grow at a slow and steady rate. Lamoille's growth rate is highest of the four regions at 5.3%. Much of this growth is in Cambridge due to its relative proximity to Chittenden County.

Table 1: Population Growth from 2000-2010 for the Addison, Bennington, Lamoille and Two Rivers Regions.

Region	2000 Population	2010 Population	Percent Change
Addison	35,289	36,200	2.6%
Bennington	35,387	35,484	<1%
Lamoille	23,233	24,475	5.3%
Two Rivers	55,784	55,996	<1%

A universal trend in these regions is that the highest rate of population growth is occurring, not in traditional growth centers, but in outlying areas that are transitioning to new growth areas. The cost and

¹⁹ *Historic Settlement Patterns*. Smart Growth Vermont, Vermont Natural Resource Council, 2012. Accessed 2012 at <http://www.smartgrowthvermont.org/learn/patterns/>.

availability of land and/or housing are the key factors influencing the growth rates across the regions. Notably, even though population growth has slowed throughout Vermont, demand on land based resources has not. Between 2000 and 2010, Vermont's population increased by 2.8% (from 608,827 to 625,741), while the number of housing units increased from 294,382 to 322,539 units, or 9.6%.²⁰ The increase in housing units is partly attributable to the second home market in Vermont. Table 2 illustrates the total home sales for each region categorized as year round or vacation homes.

Table 2: 2010 Year Round and Vacation Home Sales by County²¹

Region	Year Round Home Sales	Vacation Home Sales	Percent Represented by Vacation Home Sales
Addison	238	35	14.7%
Bennington	208	121	58.2%
Lamoille	182	87	47.8%
Orange	214	48	22.4%
Windsor	420	255	60.7%

In 2010, a large proportion of home sales in Windsor, Bennington and Lamoille counties were of vacation homes, while Addison and Orange counties saw a much lower percentage of vacation home sales. This disproportionate growth of housing units is coincident with a phenomenon called parcelization, which is the subdivision of a large parcel into several smaller ones. The impacts of parcelization on forests will be discussed at length further on in this report.

As a result of the recent recession, Vermont's unemployment rate continues to remain elevated compared to the state's historic levels over the past two decades. Nonetheless, the state level is still well below the national unemployment rate. The state's unemployment rate averaged 6.2% in 2010 which is down from 6.9% in 2009. Across the counties, unemployment in 2010 ranged from 5.0% in Chittenden County to 9.1% in Essex County. The average unemployment rates in Addison, Windsor and Orange counties were below the statewide unemployment rate, while the average unemployment rates in Lamoille and Bennington counties were higher than the statewide rate. Of the five counties considered in this report, Lamoille County has the highest unemployment rate at 7.3% (Figure 2).²²

²⁰ United State Census Bureau Decennial Census Data, 2000 and 2010. Accessed 2012 at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>.

²¹ Vermont 2011 Economic/Demographic Profile Series. Vermont Department of Labor, 2011. Accessed 2012 at www.vtlmi.info/profile2011.pdf.

²² Vermont 2011 Economic/Demographic Profile Series.



Figure 2: 2010 average annual unemployment rates by county²³

The average annual wage in Vermont rose in 2009, reaching a level of \$38,767 which represents an increase of 1.2% over 2008 levels. Among these five counties, average annual wages ranged from \$37,095 for Addison to \$32,078 for Lamoille (Figure 3). Average wages are influenced not only by the mix of industries and occupations in an area, but also other economic factors such as the proportion of part-time and seasonal jobs. Although they may pay a competitive hourly wage, part-time and seasonal jobs would lower the annual average versus a full-time job, all else equal. Notably, Lamoille County has the highest percentage of employment in the “food/accommodation” industry (26.5%), which tends to be seasonal work. Addison had the highest percentage of employment in the “agriculture/forestry” sector at 3.8%, while the other four counties each had less than one percent employed in this sector.²⁴

²³ Vermont 2011 Economic/Demographic Profile Series.

²⁴ Vermont 2011 Economic/Demographic Profile Series.

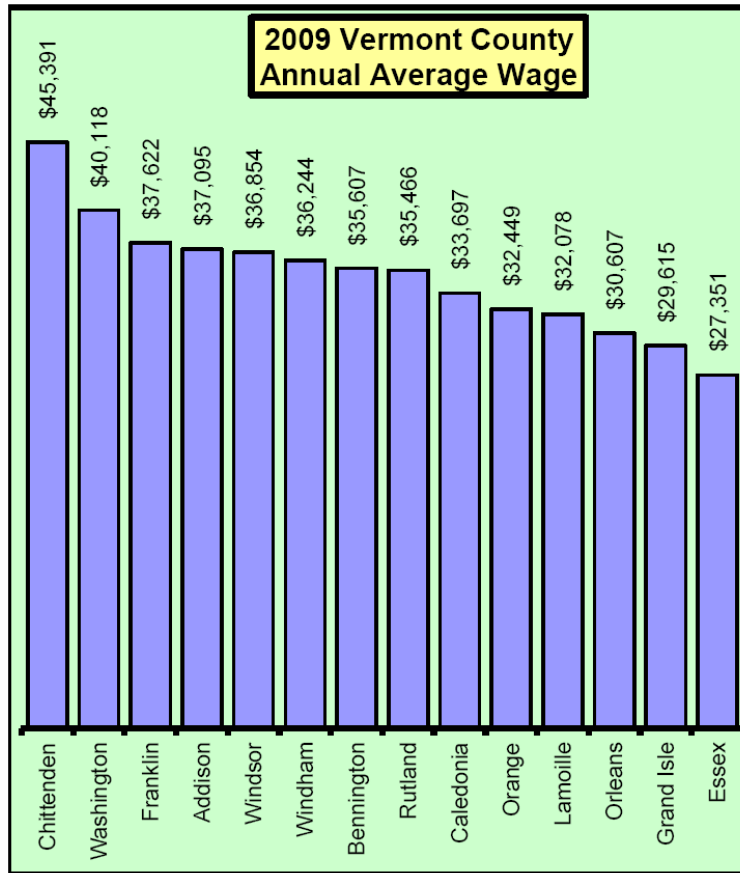


Figure 3: Average annual wages by county.²⁵

²⁵ Vermont 2011 Economic/Demographic Profile Series.

Forest Landscapes

Forests are the dominant land cover in the State of Vermont, covering nearly 80% of the land area. The predominant forest type throughout the state is maple/beech/birch, with a significant amount of white/red/jack pine forests and spruce/fir forests in high elevations, as well as aspen/birch forests. However, there is an incredible amount of landscape heterogeneity across the state, illustrated by the four regions involved in this project. Each region is unique with respect to geography, dominant topography and forest types (Figure 4). These differences, in turn, have and will continue to shape each region's relationship to its forests: both how forests are valued and how they are managed.

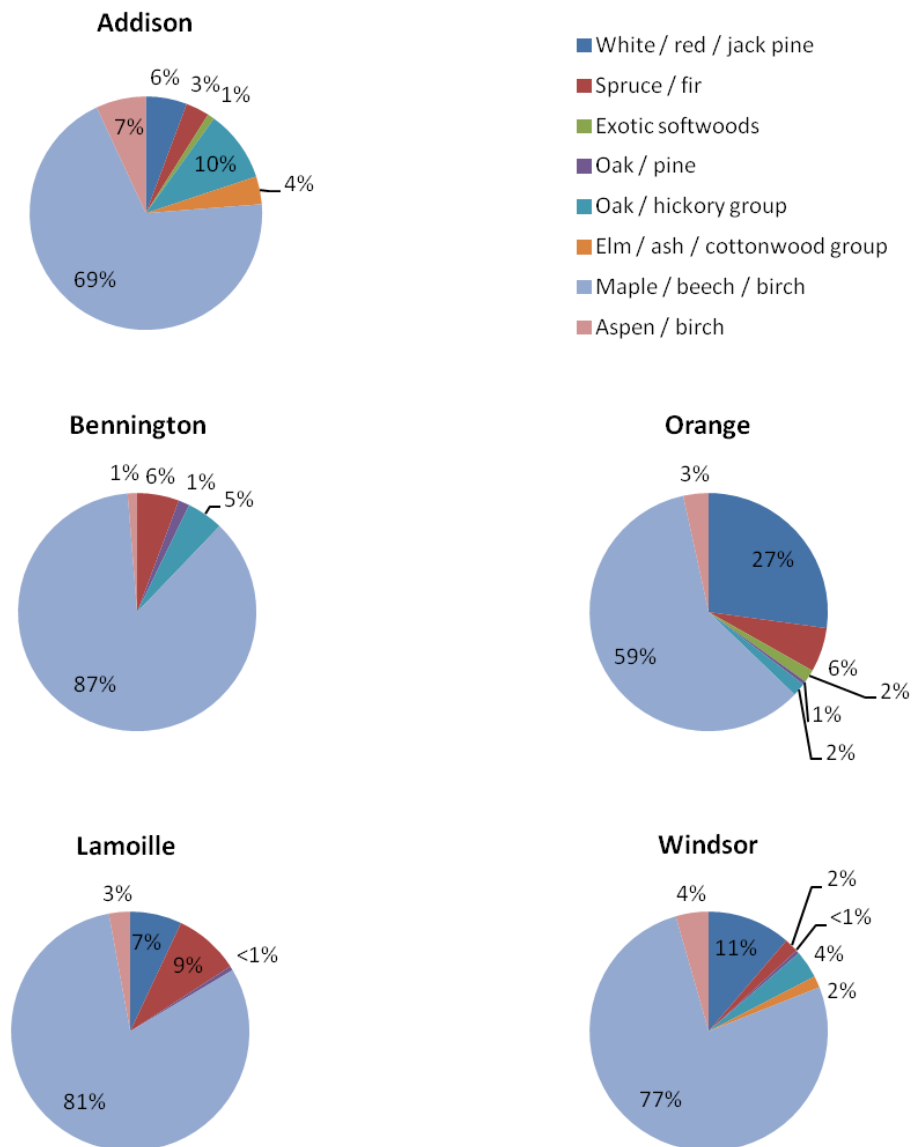


Figure 4: Forest type distribution by region

Addison

Addison County has a much larger percentage of pasture and farmland than the other regions (187,000 acres in farms - US Census of Agriculture, 2007), while forestland comprises only about 50% of the landscape. Addison County lies primarily in the Champlain Valley biophysical region of Vermont. However, the eastern third is in the Northern Green Mountain region. These two regions are distinct with different geology, soils and natural communities. The Champlain Valley region is low and warmer than the uplands of the Green Mountains and its soils are predominately clay with outcrops of limestone, dolomite and shale. Elevations range from 95 feet above sea level to less than 2,000 feet along the edges of the Green Mountain uplands. The natural forest vegetation of the valley was probably oak, hickory, maple, elm, ash, beech and white pine, a mix of some northern hardwoods with lower elevation clay plain forests. In contrast, the Northern Green Mountains are characterized by high elevations from 2000 to over 4,000 feet, cool summers and acidic geology. Northern Hardwoods dominate the slopes, and high elevations are forested with spruce and fir and alpine meadows.

Addison County is home to the majority of clayplain forest in the state. The word "clayplain" is shortened from clay-soil lake plain—the landform on which the forest grows. Since so much of the valley was cleared for agriculture, very little clay plain forest remains. The rich clay soils of the Champlain Valley have supported the longest history of settlement in Vermont. Land has been cleared and farmed since the late 18th century. In contrast, the Northern Green Mountains are one of the least populated regions of the state and much of the forestland on the steep slopes has remained intact. In the Addison County area much of the land is in public ownership as the Green Mountain National Forest.

Bennington

The great majority of land in the Bennington Region is forested and the area is extremely mountainous, including nearly all of the land at higher elevations in the Taconic Range on the west side of the region and in the Green Mountains on the east side of the region. In the Bennington Region, the predominant forest type is maple/beech/birch. A significant and important portion of the forest in the region includes oak; most of this forest type is found in the Taconic Mountains. The entire Bennington Region lies within the proclamation boundary of the Green Mountain National Forest, and large amounts of land have been acquired by the Forest Service over the years. At the present time, approximately 32 percent of the region's total land area is owned by the federal government and managed through the Green Mountain National Forest.

Bennington's topography and geography is dominated by the "Valley of Vermont," which runs north/south between the Taconic and Green Mountain ranges. As such, most development is concentrated in this narrow valley area and the surrounding lowlands. The broad Walloomsac Valley in Bennington and Shaftsbury opens to the west from this main north-south lowland area, with narrower valleys following the Hoosic River, Batten Kill, Mettawee River, White Creek, and smaller streams to the west. Smaller rural valley areas are found in mountain hollows, along the Route 100 corridor in Stamford, and in and around the Utley Flats in Landgrove and Peru. Forests in these landscape areas provide readily accessible wood resources for rural residents, many of the region's maple syrup

producing stands and Christmas tree farms, wildlife habitat characterized by extensive edge habitats and riparian corridors, and are an important part of the rural scenery.

Lamoille

Lamoille County lies almost entirely within the biophysical region of the Northern Green Mountains, with its westernmost corner lying within the Champlain Valley biophysical region. The Northern Green Mountains host the highest elevation peaks in Vermont. The Chin of Mount Mansfield (4,393 feet) stands the tallest. Other prominent peaks within Lamoille County include Belvidere (3,360 feet), Elmore, Laraway and Butternut Mountains. Besides the primary range of the Green Mountains, Lamoille County contains the secondary ranges of the Worcester, Sterling, Cold Hollow and Lowell Range. Bisecting the Green Mountains, the Lamoille River valley provides topographic diversity in the region. This river valley, with its fertile soils, brought the first settlers to the region, and to this day supports a rich farming tradition.

The region is characterized by a diversity of landscapes and elevations, creating a wide variety of vegetative types and natural communities including early succession forests, northern hardwood and spruce-fir forests, sub-alpine forests; cliffs, rock outcrops and wetlands. The most common forests are the northern hardwood forests in the lower elevations and the montane spruce-fir and spruce-yellow birch forests in the upper elevations. The Region is considered to be the “heart of recreational Vermont” and forests provide a variety of opportunities for Vermonters and tourists alike.

Two Rivers-Ottauquechee

The Two-Rivers Ottauquechee region is bounded by the Green Mountains to the West and the Connecticut River to the east. Dominated by four major river valley systems (Ottauquechee, White, Upper tributaries to Connecticut, and Connecticut), the region has some of the best agricultural soils in the low lying areas of the Connecticut and White River Valleys, while also having forests broadly distributed throughout the region. In the TRO region, only 59% of the forested area in Orange County is in Maple/Beech/Birch compared to 77% of the forest lands in Windsor County (Figure 4). Both Windsor and Orange Counties have very little Oak/Pine; this forest type exists in other areas of Vermont, but barely (representing only 2% of the forest cover across the state). Additionally, while Windsor County is relatively similar to the rest of the state in terms of White/Red/Jack Pine, Orange County has a significantly higher concentration (27% of its forested area).

A comparison of the forest landscapes of the four regions is summarized here:

Table 3: Comparison of Regional Forest Characteristics

Landscape Characteristics	Addison	Bennington	Lamoille	Two-Rivers
Percentage of Public Forest Lands	38%	51%	22%	17%
# of Dominant Biophysical Regions	2	3	1	4
Agricultural Land	40%	9%	11%	11%
Forest Fragmentation	Low in GMNF, High in Champlain Valley	Low	Medium	High
Recreation Focus	Low	Medium	High	Low

Forest Resource Values

Vermont's forests provide a wide range of services that support the region economically, environmentally, and socially. Our forests are a source of raw materials that support traditional forest products industries, such as hardwood veneer, lumber, pulpwood, fuel wood, chipwood and maple syrup. Forests also provide services not easily quantifiable solely in economic terms; filtering the water and air, contributing to soil fertility through nutrient cycling, providing plant and wildlife habitat, and helping to sequester carbon.²⁶ Forests represent cultural values, and have the potential to serve as an educational resource, a connection to our historic rural-based economy, and a contributor to the quality of life for future generations, providing recreational opportunities, scenic beauty, and a physical place to connect with the natural world. The steering committees of each region identified specific values supported by each region's forest land resources. This section of the report will describe those values within the context of each region.

Economic Values

Vermont's working landscape supports a forest products industry estimated to generate over 1 billion dollars annually in the state and helps private forest land owners cover ownership costs. It is estimated that 6,379 Vermonters are employed in forest-based manufacturing, while approximately 13,000 people are thought to be working in some type of forest related profession (manufacturing, tourism, and recreation).²⁷ When considering the economic value of forest production, land is analyzed based on its suitability for sustainable harvests of wood to meet a variety of needs, including lumber, furniture, specialty wood product manufacturing, paper production, biomass energy, and other economic activities such as maple sugaring and Christmas tree farming. Two factors are of overriding importance in determining potential for supporting productive forests: soil quality and land use. Access is another important factor in assessing an area's suitability for effective forest management. Many of the most important access

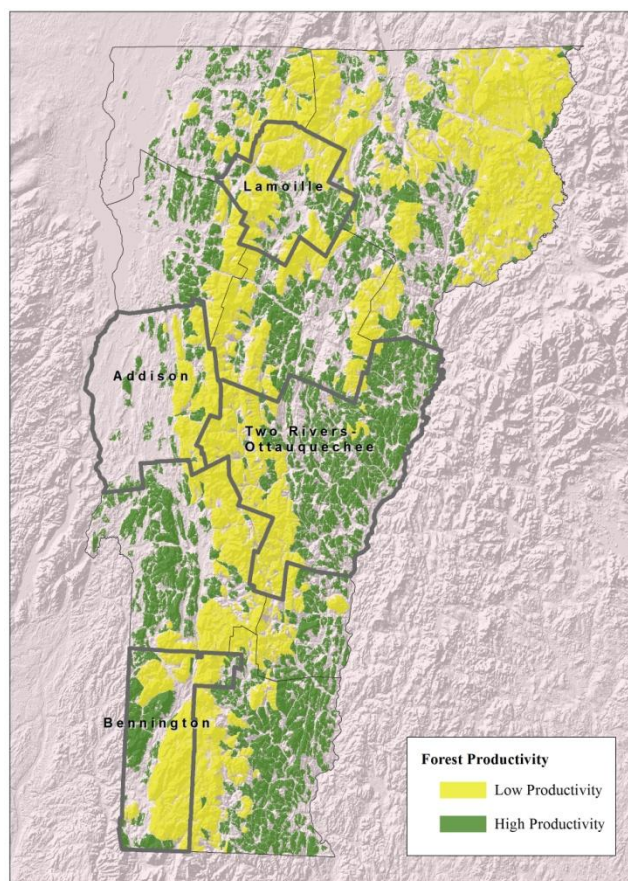


Figure 5: Forest productivity statewide, with the four regions highlighted.

²⁶ Vermont Dept of Forests, Parks and Recreation (2011). Vermont Forest Resources Plan: State Assessment and Resource Strategies.

²⁷ North East State Foresters Association, "The Economic Importance and Wood Flows from Vermont's Forests, 2007," (2007). Website: <http://www.vtfpr.org/includes/documents/ecimportfor.pdf> (accessed June 13, 2012).

considerations (e.g. erodibility, rock outcrops, slopes, soil drainage class) are included in the USDA Natural Resource Conservation Service soil rating, which rates soils in Vermont based on their potential for supporting economically viable forestry activities. Such ratings consider the potential growth of northern hardwoods along with the costs and limitations of managing woodlands on those soils.

The resulting Forest Productivity and Timber Resources map (statewide shown in Figure 5; regional maps in Appendices) depicts the potential for forest productivity as well as the location of current producers. The Forest Productivity layer was developed by the Vermont Land Trust, by initially selecting forest blocks greater than 500 acres and then conducting a weighted spatial analysis using the inputs of geology (30%), elevation (25%), hardness zones (15%), landforms (15%), slope (10%), and precipitation (5%). The Bennington Region included all developed lands in the “low” productivity category, recognizing that conflicting development can preclude management for forest products even if soil conditions are favorable.

Higher productivity forest lands are generally located in the Vermont Piedmont and Taconic biophysical regions, while lower productivity forest lands occur in the Green Mountains and the Northeast Highlands, primarily due to the soil types prevalent in these regions. Notably, areas ranked as higher productivity forests do not necessarily coincide with the areas where most of the large-scale harvesting occurs. Much of the lands ranked as higher productivity are located in rural valley areas characterized by agricultural fields and woodlots. Because these are among the best soils for a variety of uses, and because access from maintained roads is relatively easy, forested areas are interrupted by cropland, pasture, and rural residential development. Most of Vermont’s maple syrup operations and Christmas tree farms are located in rural valley areas, and many residents of these areas utilize trees from easily accessible woodlots for firewood and other domestic uses.

Timber Harvesting

Forest Resource Harvest Summaries from the Vermont Division of Forestry provide a picture of how our forest resources are being utilized. As a result, we are able to understand the relationship between forest productivity and the commercial demand for wood by consumers. This information becomes even more critical with increasing economic pressures within the wood product industry. The Harvest Report lists volumes of wood harvested each year by species and the county of origin. Volumes of saw and veneer logs, pulpwood, whole-tree chips and sawmill residues are all summarized in the report's tables. The following series of graphs compare the harvest data trends among the four regions. A quick disclaimer regarding the forthcoming graphs and statistics cited in this section: those representing the TRO region are premised on an analysis of Orange and Windsor Counties where the majority of TRO towns are located (27 of 30 towns). In reality, TRO towns are spread out over four counties (Orange, Windsor, Addison, and Rutland); however, since data is often gathered by the federal and state governments at the county level only, an analysis of Orange and Windsor Counties was deemed the best option for presenting a close approximation (rather than an exact accounting) of forest resources in the TRO region.

The state harvest data from 2000-2010 shows hardwood and softwood both in decline over the ten year period, with hardwood and softwood harvests closely tracking each other. The state's forest industry increased total production between 2008 and 2009, though the hardwood harvest was nearly identical in terms of board feet in 2009 as in 2008. During this same time period, the amount of softwood produced (as measured in board feet) increased significantly.²⁸ Statewide the number of sawmills has also declined from a high of 169 in 2000 to a low of 105 in 2010.

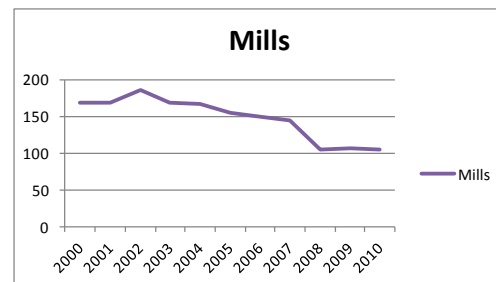
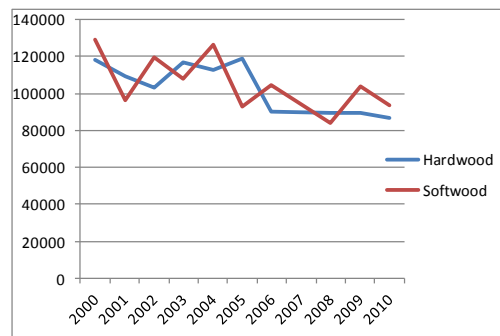


Figure 6: Vermont Forestry Harvest Data

Figures 7 and 8 show the sawlog and veneer harvest data for each region (TRO shown as Orange and Windsor counties) from 2000-2010. Windsor County had the largest share of both hardwood and softwood harvest, although it experienced a pronounced dip during the 2008 season. Lamoille County had the second highest share of the hardwood harvest, followed by Bennington, Orange and Addison counties, respectively. Orange County had the second highest share of the softwood harvest behind Windsor, followed by Lamoille, Addison and Bennington, respectively. Relative to land area, Addison yielded the lowest harvest volume for both hardwoods and softwoods while Lamoille yielded the highest hardwood harvest volume. The Windsor harvest volume shows a precipitous rise and fall; however, this is likely due to a major producer who stopped reporting. The caveat to the harvest report data is that it is largely underreported.

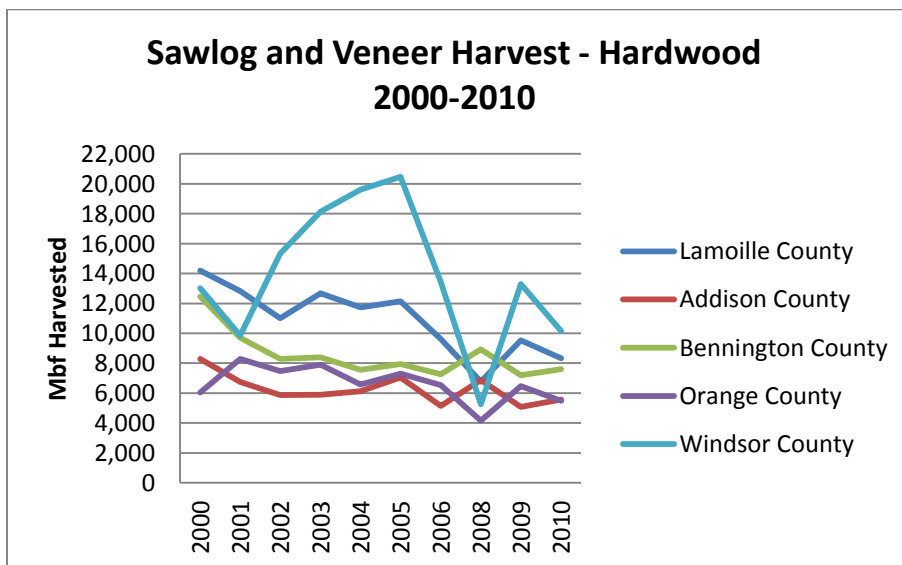


Figure 7: Sawlog and veneer harvest data, Vermont Forest Harvest Reports, 2000-2010.

²⁸ Vermont 2011 Economic/Demographic Profile Series. Vermont Department of Labor, 2011. Accessed 2012 at www.vtlni.info/profile2011.pdf

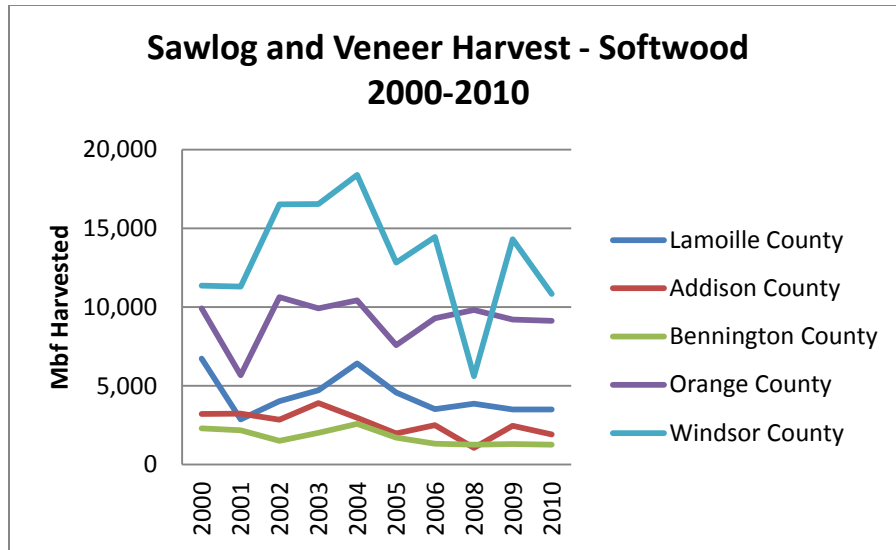


Figure 8: Sawlog and veneer harvest data, Vermont Forest Harvest Reports, 2000-2010.

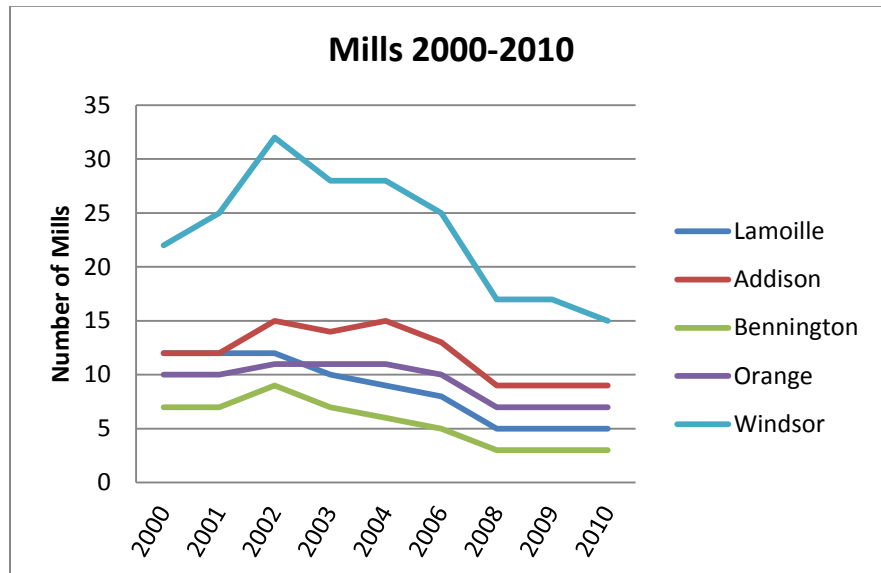


Figure 9: Number of mills by region, Vermont Forest Harvest Reports, 2000-2010.

Throughout the decade of 2000-2010, Windsor County maintained more sawmills than the other regions, reflecting its generally higher harvest volumes. Similar to statewide trends, all regions experienced a decline in the number of mills from 2000 to 2010, reflecting the decline in harvest volumes. The past decade has been characterized by significant economic challenges to the Vermont sawmill industry. The decline of the housing market, current recession, and subsequent decline of construction is further compounding this challenge. As an adequate number of sawmills throughout the state supports quality forest management and forest diversity, the increased transportation distance sawlogs must travel to a mill increases the cost of production and harvesting, simultaneously decreasing the profit margin of marginal species and grades. Currently, the majority of the state's hardwood is filtered into established major supply routes throughout the Northeast due to the lack of adequate local processing facilities as well as the overall lack of production volume. Local hardwood is transported to

Canadian sawmills for production. As the number of sawmills decline, there is a point where the number becomes too small to adequately support a diverse market.²⁹

According to the U.S. Forest Service, statewide increases in the volume of growing stock are twice that of harvesting rates. Past harvesting practices have selectively removed only the highest quality stems (high-grading) resulting in roughly 15 percent of northern Vermont's growing stock being of such poor quality that it is of little or no commercial value (live-culls). In combination with irregular markets for wood chips, this places further demand on high-quality stems. Over eighty percent of Vermont forests are privately owned. In 2008, an estimated total sale of stumpage earned by Vermont landowners was about \$22 million.³⁰ There is a need for sustainable management and harvesting practices that encourage the regeneration of native species in order to improve overall forest quality and value from an economic point of view.

Maple Products

Vermont is the nation's leading maple syrup producer with operations distributed around the state in small family businesses with a handful of large operations.³¹ Vermont maple syrup production in 2009 was 920,000 gallons, the highest production since 1944, and an increase of 30% from 2008.³² Vermont has successfully marketed its many maple products, and currently produces more than any other state to meet the demand of consumers. From maple syrup to maple butter, the sap from the sugar maple has been utilized for generations and has become an integral part of the cultural integrity of Vermont. 'Sugaring season' still remains a quintessential Vermont tradition, even though modern sugarmakers rely upon vacuum and tubing sap distribution, reverse osmosis sugar concentration and super-efficient evaporation systems.

Figure 10 show the maple syrup taps and production (in gallons) by county for the four regions. TRO is represented by Windsor and Orange counties. Of these five counties, Lamoille was the largest producer in 2007, at nearly 100,000 gallons from about 357,000 taps and 62 sugarmakers. This represents 15% of the total Vermont production in 2007. Bennington produced the least amount of maple syrup, at roughly 10,000 gallons. The regions of Addison, Bennington, Lamoille and Windsor saw an increase in the number of taps from 1997 to 2007. Interestingly, from 2002 to 2007 only Lamoille and Addison (northern regions) saw a parallel increase in the gallons of syrup produced, while Bennington and Windsor (southern regions) experienced a decrease in the gallons of syrup produced. These opposing trends for northern and southern regions may be related to a warming climate, although two years of data is by no means conclusive. Further study of statewide production data is warranted.

²⁹ Vermont Forest Resources Plan, 2010.

³⁰ Vermont Current Use Advisory Board, 2010, from Vermont Forest Resources Plan, 2010.

³¹ New England Agriculture Statistics, 2011. Accessed 2012 at <http://www.nass.usda.gov/Statistics by State/>

³² Vermont Forest Resources Plan, 2010.

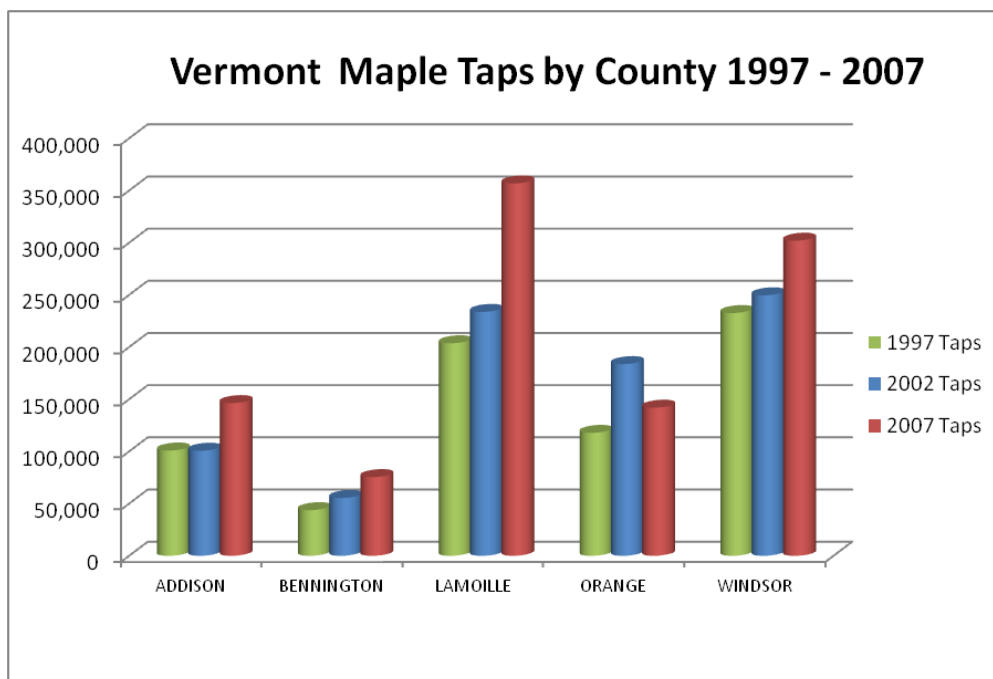
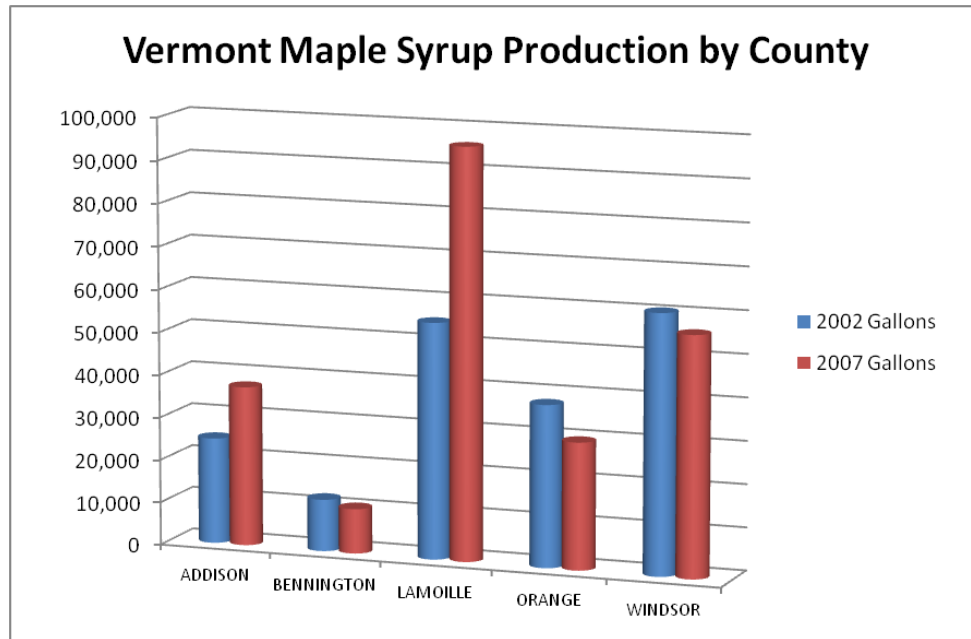


Figure 10: Maple syrup taps and production by county, New England Agricultural Statistics 2011.

Christmas Tree Production

In 2007, Vermont sold about 168,000 Christmas trees worth approximately \$10-\$12 million dollars. This was about a 10% increase over 2002. Acreage devoted to Christmas tree production decreased from about 4600 acres 2002 to 3600 acres in 2007. Likewise the number of operations with production acreage also decreased from 359 to 318. As shown in Figure 11, Addison's planted acreage remained fairly stable, Lamoille registered a slight decrease in planted acreage, while Bennington, Orange and

Windsor experienced significant declines in planted acreage.³³ From 2002 to 2007, Bennington saw an increase in the number of trees harvested; Addison and Windsor saw a slight decrease, while Lamoille and Orange registered a significant decline.

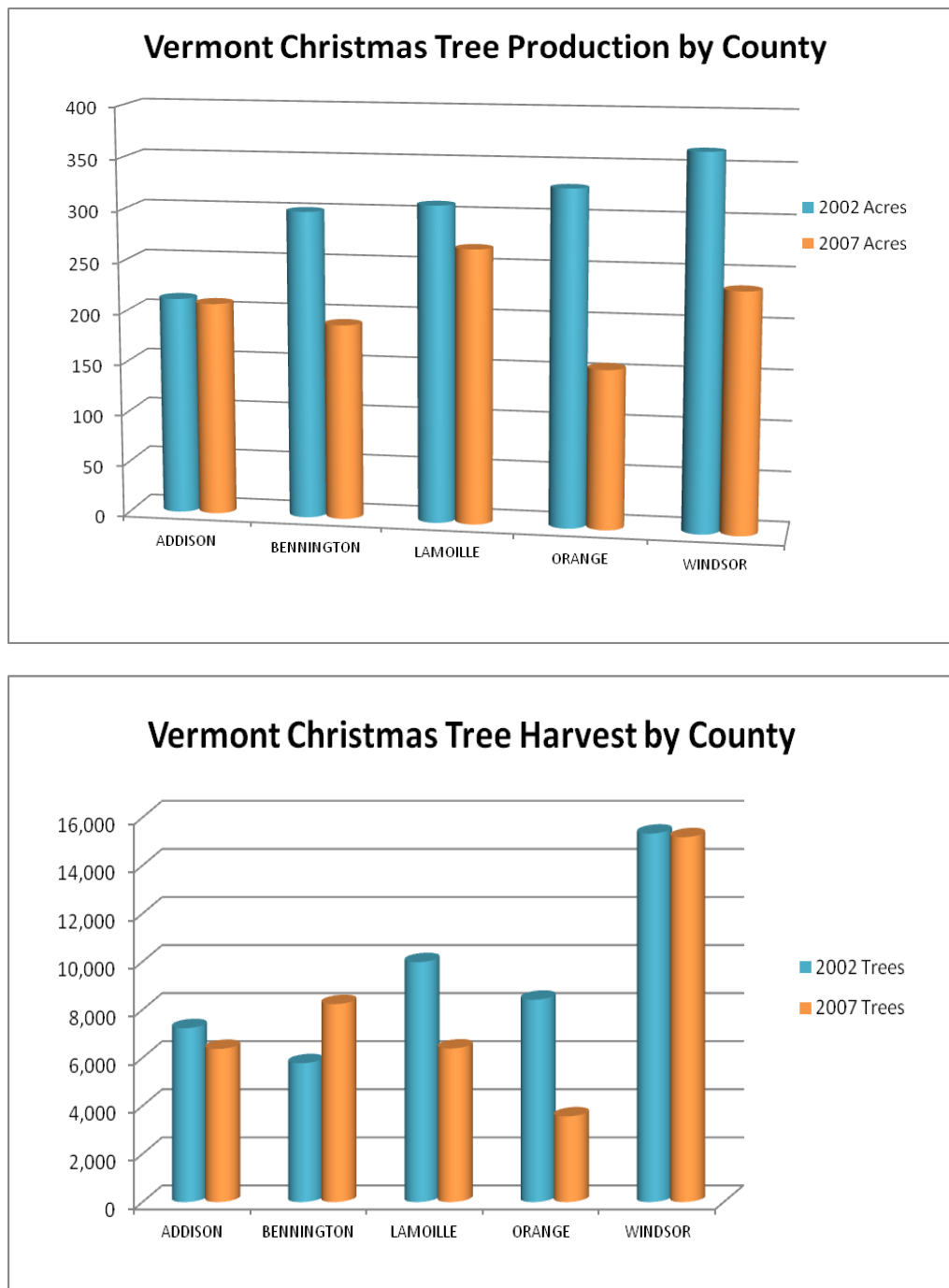


Figure 11: Christmas tree acres in production and trees harvested 2002-2007, New England Agricultural Statistics.

³³ Vermont Forest Resources Plan, 2010.

Ecological Values

Air Quality

Tree and forest canopies significantly contribute to air quality through the sequestration of air-borne pollutants. Simultaneously, the release of volatile organic compounds from trees influences the production of ground level ozone. Vermont is currently within national standards for criteria pollutants, but it is important to note that the state is still affected by acid deposition on sensitive forests, poor visibility on warm days, ozone injury on sensitive plants and increasing atmospheric carbon dioxide³⁴. Overall within the region, given the lack of industrial development, local air quality concerns are limited mainly to emissions from traffic, heating systems (e.g. woodstoves) and some agricultural practices. It is important to note that currently, Chittenden County is at risk for non-attainment status due to the amount of particulate matter and ground-level ozone, as the cumulative effect of these sources may increase with additional growth and may have greater impact on local air quality. Other concerns include impacts on air quality resulting from out of state activities that pose a serious threat to fragile, high elevation ecosystems. In particular, acid rain, caused in part by coal-fired energy plants operating to the west of Vermont, has damaged plant communities in the vicinity of Mount Mansfield³⁵.

Water Quality

The quality of surface and ground water is essential to the well-being of the area's population and to the regional economy. Surface waters have inherent value to residents, and also support fish and wildlife, recreational, scenic, and economic development values. Clean ground waters feed into streams, ponds, and wetlands and also provide much of the potable water for domestic and commercial consumption. These resources are widely distributed throughout each region's landscape areas and rely on forest cover to maintain their quantity and quality. Rivers and streams are abundant throughout the state. These waterways were of great importance to early inhabitants of the area, serving as travel routes, water supplies, and sources of power. They continue to have practical value to communities for water supply, disposal of treated wastewater, and potential generation of hydroelectric energy. In addition, residents and visitors have placed great value on maintaining these resources for swimming, boating, and fishing, as well as for their aesthetic contribution to the landscape.

Upland forests contain all of the Class A headwaters in the state and many larger streams that include fisheries, waterfalls, swimming holes, and other recreational and scenic resources. Most of the relatively densely developed town and village centers lie along rivers and streams where those features are important scenic, cultural, and recreational assets. Many village centers developed around small waterfalls that provided power for early mills; those waterfalls are important scenic resources today and where existing dams and millponds are found, represent future hydroelectric resources. Lakes, ponds, and wetlands are found predominantly in the rural valley landscape, but high elevation ponds and wetlands are common in the Green Mountains. Lakes and ponds are popular recreational sites and are highly valued for their contribution to the scenic quality of the surrounding landscapes. Wetlands are

³⁴ Vermont Forest Resource Plan, 2010.

³⁵ Town of Stowe, Vermont Municipal Development Plan, 2009.

highly productive ecological areas that help to maintain surface and ground water quality, support fish and wildlife populations, and in riparian areas, provide flood and storm water control.

Landscape stewardship promotes the restoration and maintenance of forested watersheds to ensure clean water, the protection of soils, and the health of aquatic and terrestrial ecosystems. Maintaining and restoring forests in large blocks plays a fundamental role in reducing many pollutants in waterways, including nitrogen, phosphorus, sediment, and *E. coli* impairment. Forests offer long-term, sustainable improvements in water quality through infiltration and wetland retention; the absorption and storage of storm water runoff; and increased flood resiliency.

Carbon Sequestration and Storage

Climate change represents a considerable current and future challenge to forest sustainability. At the same time, it represents an opportunity to promote the value of forests in providing temporary mitigation of greenhouse gas emissions (GHG) through carbon sequestration and storage³⁶. Vermont's greenhouse gas emissions (GHG) in 2005 were estimated at 9.07 MMtCO₂e5 (MMT=million metric tons, CO₂e=CO₂ equivalents)³⁷ (Governor's Commission on Climate Change Report, October, 2007). Carbon storage in forests and wood products was estimated at 9.0 MMtCO₂e, which contributes significantly to reduce total GHG³⁸. The implementation of forest management strategies that increase carbon sequestration and storage from forests with low carbon can significantly contribute to GHG reduction throughout the state. Private landowners have the opportunity to significantly contribute to carbon sequestration through sustainable forestry practices. Pressures from forest conversions, harvesting wood for energy, and infestations of non-native destructive pests or changes in private or public land management can alter the extent of forest mitigation of GHG³⁹.

Wildlife Habitat

Wildlife habitat at the regional level is best supported by maintaining large contiguous blocks of forest land. These areas may have various age classes of forest cover and may be composed of other habitat types such as wetlands or old meadows. Ideally, these areas are connected with other similar areas so that the animals that use them can move freely to other forest areas and habitats. Riparian habitat along streams and rivers, strips of forest cover between developed areas, and hedgerows represent potential connecting habitat. Contiguous habitat supports native plants and animals, including species like bobcats and black bears that require large areas to survive as well as animals with relatively small ranges such as salamanders that utilize these corridors in order to find seasonal sources of food, to breed, or to hibernate. Additionally, contiguous forest can buffer species against the negative consequences of fragmentation.⁴⁰

³⁶ Vermont Forest Resource Plan, 2010.

³⁷ Final Report and Recommendations of the Governor's Commission on Climate Change, 2007.

³⁸ Vermont Forest Resource Plan, 2010.

³⁹ Vermont Forest Resource Plan, 2010.

⁴⁰ Vermont Fish and Wildlife Department and Agency of Natural Resources, 2004. Conserving Vermont's Natural Heritage: A Guide to Community-Based Planning for the Conservation of Vermont's Fish, Wildlife, and Biological Diversity.

An analysis undertaken by the Vermont Fish & Wildlife and the Vermont Land Trust developed a process to identify and delineate unfragmented forest habitat blocks 20 acres and larger and assess their connectivity. Habitat blocks were delineated by selecting blocks of forest from land cover data, and subsequently evaluated using 11 factors to assess their ecological value. Factors considered included cost distance to core areas, ELU (Ecological Land Units) weighted acreage, element occurrence count, percent core, block size, road density, percent ponds, percent wetlands, exemplary aquatic features, density of rivers and streams, and percent of block within a TNC matrix block. All these factors were combined to calculate a weighted score for each habitat block⁴¹. The result is a map depicting the quality of large habitat blocks (Figure 12 – Habitat Blocks). The results are important for forest stewardship at the regional and municipal level. Aerial photography and satellite imagery provides an understanding of the forest extent, but communities have been lacking an assessment of the ‘quality’ of large blocks of forest land. The Habitat Block Map, statewide shown at left and region specific in Appendices, depicts the quality ranking, from low quality (red) to high quality (green).

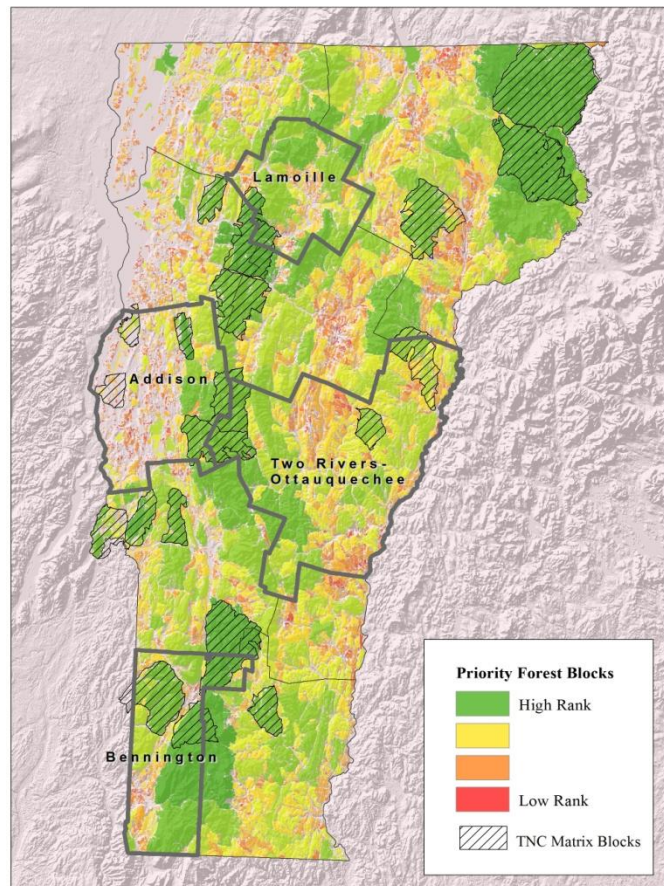


Figure 12: Habitat Blocks statewide

The availability of large blocks of contiguous forestland varies by biophysical region within the state. Bennington and Lamoille regions contain the largest contiguous tracts of high quality habitat, in the southern and northern Green Mountains, respectively; Addison has good habitat in the Green Mountain National Forest, while the Champlain Valley is generally comprised of the smaller, fragmented clayplain forests; TRO region has the most fragmented habitat, with some good habitat in the foothills of the Green Mountains and Taylor Valley. Managing at the landscape level requires recognizing and maintaining large contiguous forest habitat blocks as well as connecting lands between the contiguous blocks. Wildlife management and sustainable timber management can both benefit from conserving large blocks of forestland. Timber management is easier to conduct on large contiguous blocks of land.

The more developed areas of each region, which tend to be located in river valleys, exhibit increasing amounts of habitat fragmentation. In these areas, forested corridors along streams and rivers between

⁴¹ Osborne, J., Sorenson, E., & Hilke, J. (2009). Habitat Block and Connectivity Analysis. Available from http://www.vcgi.org/commres/vsdp/archive/hilke_osborne_hab_block_connect.pdf

otherwise fragmented forest blocks in rural valleys provide vital cover and travel routes for numerous wildlife species. Although forests in towns and village centers are relatively small and include fewer critical ecological landscape units and rare or significant species and natural communities, they nonetheless provide some important habitat for small species that should be identified and protected. Wildlife resources and the lands and waters that support them are significant to the quality of life for those who live in and visit Vermont. Wildlife-based activities including hunting, fishing, viewing, and photography are estimated to have brought more than \$383 million dollars to the state's economy⁴². The region's rural characteristics provide ample hunting opportunities for both residents and non-residents alike. In fact, a new survey says hunters spend more than \$189 million in Vermont annually. The survey conducted by the U.S. Fish and Wildlife Service and the U.S. Census Bureau says about \$151 million is spent on equipment, more than \$20 million is trip-related and more than \$17 million is spent on other items. The state Fish and Wildlife Department reports that in 2010, 79,603 people bought Vermont hunting licenses. Nearly 11,000 of those were nonresidents. Most of these licenses are for deer hunting. Vermont ranks third in the nation in participation in wildlife-related recreation, including hunting, fishing and wildlife watching.

Recreational and Scenic Values

Forested lands support a variety of outdoor recreational activities as well as the tourism industry; both are major components of Vermont's economy. The recent, 2007, report from the North East State Foresters Association stated that Vermont's "forest attracts millions of visitors to the state for recreation and tourism activities, contributing almost \$500 million "A comparable report issued in 2001 noted that forest related recreation and tourism increased almost two-fold from 257 million in 2001 to 485 million in 2005. Each 1,000 acres of forest land supports 1.4 forest-based manufacturing jobs as well as 1.4 forest-related tourism jobs.⁴³

Maintained recreational trails throughout the state total over 8,100 miles⁴⁴ and are located on both public and private lands. Major Public access trails across the state include the Appalachian and Long Trails, the Catamount Trail, a backcountry ski trail that runs the entire length of Vermont, and the VAST (Vermont Association of Snow Travelers) snowmobile trails, as well as many privately owned trail networks.

The Green Mountain National Forest (GMNF) encompasses more than 400,000 acres in southeastern Addison County and central Vermont in the Green Mountain Biophysical Region, forming the largest contiguous public land area in the State. The Forest includes three nationally designated trails: The Appalachian National Scenic Trail, Long Trail National Recreation Trail, and the Robert Frost National Recreation Trail. Statewide, the GMNF includes three alpine ski areas, seven Nordic ski areas, and approximately 900 miles of multiple-use trails for hiking, cross country skiing, snowmobiling, horseback

⁴² Vermont Forest Resources Plan, 2010.

⁴³ North East State Foresters Association, 2001, 2007. The Economic Importance of Vermont's Forests.

⁴⁴ Vermont Forest Resources Plan, 2010.

riding, and bicycling. In addition to recreation opportunities, the Forest includes a variety of species of plants and animals that attract visitors⁴⁵

Particularly significant recreational features, in addition to the trail systems, include town and state parks and campgrounds, downhill and cross country ski centers, streams, rivers, and lakes with public access points, and unique landscape features such as waterfalls, caves, and scenic mountain summits and ledges. Most of the diffuse and long-distance trail-based recreational resources are found in the upland forest areas of both the Taconic Mountains and the Green Mountains. The shorter trail networks are located primarily in rural valley and town and village center areas, and are used frequently by residents of those communities. Maps of region specific recreational resources are shown in the Appendices.

The ski industry has historically been a primary driver of Vermont's economy. In 2007-2008, Vermont logged over 4.3 million skier visits, with direct spending estimated at \$750 million and \$700 million in indirect spending for a total economic activity due to skiing of about \$1.5 billion (Vermont Forest Resources Plan, 2010). Perhaps more than any other region, Lamoille's economy is focused around skiing. With two of Vermont's largest ski resorts, Smugglers Notch Resort and Stowe Mountain Resort, located within the county, and several others located within a half hours drive, the ski industry continues to be a major draw and in many ways is the anchor of Lamoille County's tourism economy. However as economic pressures and warming winters have impacted the industry, the county and the state as a whole has begun to shift toward an economy based on more four season activities.

Forests play an important role in the four-season recreation industry; which includes activities like road cycling and mountain biking, kayaking and canoeing, dayhiking, backpacking, guided expeditions, and zipline tours. With increased demand for more diversified facilities like multi-use trails that support a variety of activities, public land managers are faced with the challenge of maintaining recreational trails and structures in light of the increased and diversified use.

The state's forested mountainsides and colorful rural valley woodlots provide a vivid backdrop, with forest types varying by elevation. Vermont's forests are dominated by northern hardwood species such as sugar maple, birch, and beech. Other common species include white pine, hemlock, aspen and oaks in lower elevations and spruce and fir at higher elevations. This species diversity provides a dramatic background in the fall, and the foliage season significantly contributes to the state's economy by attracting visitors from all over the world.

The publication, *Vermont's Scenic Landscapes: A Guide for Growth and Protection* identifies several specific attributes that make landscapes distinctive and visually appealing. Two of the most important

⁴⁵ USDA Forest Service, Eastern Region. (2006). Green Mountain National Forest - Land and Resource Management Plan. Available from http://www.fs.fed.us/r9/forests/greenmountain/htm/greenmountain/links/projects/docs/forest_plan/final_gmnf_plan_sep08.pdf.

are landscape contrast and spatial quality. Landscape contrast refers to the natural visual contrast between different elements in a view; an open field or pond set against a backdrop of a forested mountain, for example. Scenic views are enhanced by spatial quality that includes contrasting elements, such as mature trees or forested areas that frame or define a view.⁴⁶

Historic and Cultural Values

When one thinks of Vermont, the forested landscape comes to mind instantly: the lush green hills (hence ‘the Green Mountain State’) or the splash of orange, red, and yellow which explodes and then fades during the autumn months. As a defining physical feature of the landscape, forests have become embedded in Vermonters’ heritage and identity. However, the characterization of Vermont as a forested landscape is a relatively recent phenomenon. Most of the focus of the early settlers to Vermont was to clear the forests for agriculture. Beginning in the mid-1700s, clearing of forest lands began in earnest, and just 150 years ago, most of the valley lands and much of the mountainsides were devoid of trees. A slow, but steady, reforestation process began in the late 1800s and continues to this day, as previously open land is reclaimed through processes of natural ecological succession. At this point in time, three-quarters of the state is forested.

The working landscape defines Vermont and is a prominent feature common to these four regions. As the most rural state in the nation, residents live in small towns and communities that are near farms, meadows and forests. Economic livelihoods are tied to the natural environment as farmers, foresters, sugar makers, outdoor enthusiasts and tourists. Forested lands play a significant role in our historical and current cultural heritage. The Vermont tradition of the private landowner making a living off of their land is tied to the sustainability of forestry management practices. The economics are tied to the ecological maintenance of the land. Forested lands provide recreational, wildlife, and timber resources and contribute to the health of watersheds. The forested landscape provides a cultural connection to the natural environment, while at the same time, has the potential to provide a way of life that has been passed down through the generations.

Threats and Limitations to Forest Sustainability

The forests that cover much of the region are a vital part of our landscape and preservation of this resource is vital to our future quality of life and economic prosperity. There are limitations, however, to the amount of forestland that can be expected to be maintained in the future and there also exist very real threats to the quantity and quality of the resource. These limitations and threats can be generally classified into three categories:

- Environmental Threats—deriving primarily from chemical deposition (“acid rain” and similar pollution), climate change (affecting both forest health and species composition), and the introduction of pests and invasive species.
- Incompatible Development and Fragmentation—resulting from construction of buildings (largely residential) and supporting infrastructure in forested areas; also, subdivision of large tracts of forest land that poses challenges to long-term forest management and sustainability.

⁴⁶ Vermont Agency of Natural Resources, 1991. Vermont’s Scenic Landscapes: A Guide for Growth and Protection.

- **Economic Conditions**—which include the cost of maintaining forest land, the lack of economic opportunities for the use of forest resources, and related economic pressure to convert forests to alternative uses (such as residential uses as noted above or, in future scenarios, to agricultural uses).

Some of the limitations may stem from the implementation of local and regional values and may prove to represent appropriate responses to difficult challenges. Others, however, are the result of external influences that are in conflict with local and regional needs and desires, and some may be attributable to ineffective planning. Once these factors are identified and understood, it is possible to determine how to best respond to minimize the loss of important resources opportunities.

Environmental Threats

Acid Rain Deposition

The threats of acid deposition to forest sustainability have been documented and understood for many years. Oxides of sulfur, nitrogen, and carbon emitted from fossil fuel combustion—coal or natural gas fired power plants, industrial processes, and motor vehicles—react with water vapor in the atmosphere to reduce the pH of rain, snow, and mist that is deposited in soil or taken up directly by plants from the atmosphere. Most of these pollutants are carried into the region from centers of population in New York, the Midwest, and southern Ontario by prevailing westerly wind flows. Although acid deposition can affect all parts of the forest system (i.e., increased winter injury on red spruce trees), its impacts on soil productivity is of particular concern to forest health. Acid deposition can increase leaching of valuable soil nutrients making them unavailable for tree growth⁴⁷. Of particular concern are calcium depletion and aluminum toxicity; both have been shown to adversely affect sugar maple growth⁴⁸. Acidic mist or “fog”

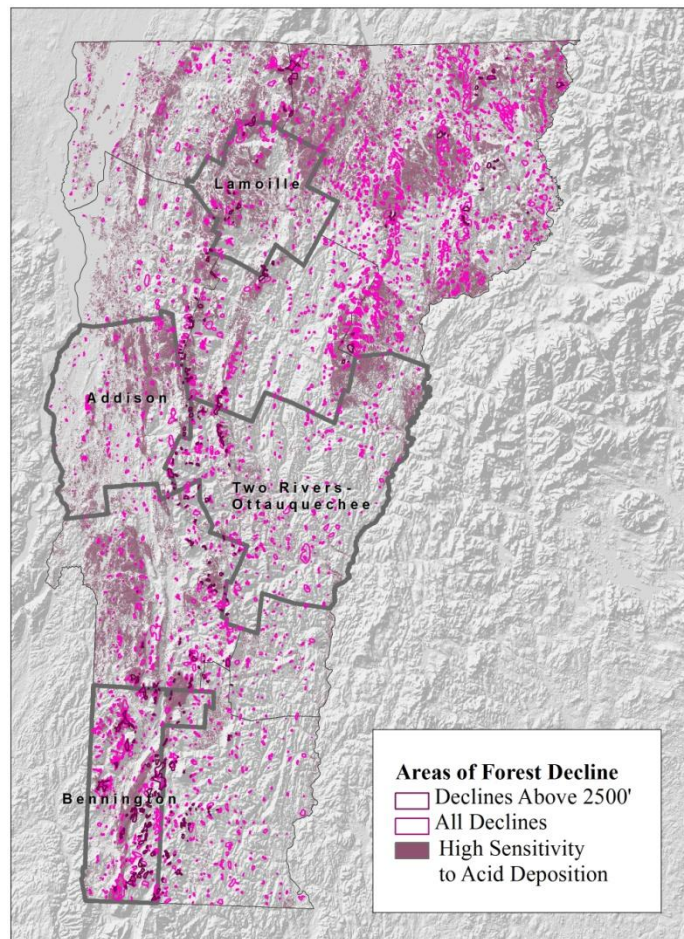


Figure 13: Environmental Constraints

⁴⁷ Driscoll, C.T., et al, 2001. Acidic Deposition in the Northeastern United States: sources and inputs, ecosystem effects, and management strategies. *BioScience* 51, 180-198, cited from Vermont Forest Resources Plan, 2010.

⁴⁸ Long, et al., 2009. Sugar maple growth in relation to nutrition and stress in the northeastern United States. (*Ecological Applications* 19(6) cited from Vermont Forest Resources Plan, 2010.

can reduce the ability of leaves to carry on photosynthesis. These impacts are exacerbated in upland forest landscapes, where soils are steep, thin, and poorly buffered against acidic deposition. This can be seen in Figure 13 – Environmental Constraints, which shows areas in the state vulnerable to acidic deposition. Note the correlation between high sensitive areas and forestry declines above 2,500 feet.

Climate Change

Many of the same sources that add acidity to the atmosphere also add carbon, often in the form of carbon dioxide and other “greenhouse gases” that promote the retention of solar energy in the lower atmosphere, leading to an increase in mean temperatures. The consequences of a warming climate to the region’s forests can be severe. Although warming and cooling trends have occurred in the past, those changes took place much more gradually and natural progression in changes to species composition and ecosystem dynamics resulted. The process being observed presently, however, is driven by the release of several hundred million years’ worth of stored carbon (from the combustion of fossil fuels) at an increasing rate over just the past several decades. The resulting climatic changes are thus much more rapid, dramatic, and difficult for natural systems to respond to in a healthy manner.

Since 1900 the average temperature in the Northeast has increased 1.5°F. In the next 20 to 30 years temperatures are projected to continue increasing more in winter (from 2.5°F to 4°F) than in summer (1.5°F to 3.5°F). Currently we experience around five days per year with temperatures exceeding 90°F. By late-century, we can expect nine times that number, with 45 days per year exceeding 90°F. The Northeast is projected to see a 10% increase (about four inches per year) in annual precipitation by the end of the century. Winter precipitation is expected to increase by 20% to 30%, but because of the prediction of a rise in temperatures, more and more of this precipitation is going to fall as rain. As a consequence of more precipitation in the winter, whether it falls as rain or snow, more flooding of rivers and streams is expected in the springtime.⁴⁹

Specific impacts on forests of climate change are wide-ranging. Increases in carbon dioxide and temperature may have a positive effect by increasing the rate of tree growth, but increased temperatures are also likely to increase evapotranspiration, soil drying, and the frequency of short-term droughts. Spruce-fir forests, common at higher elevations in the region, are likely to significantly decline as conditions warm. Only slightly less vulnerable are northern hardwood forests whose dominant species are sugar maple, yellow birch and American beech. These forests are expected to be nearly eliminated in Vermont, replaced by species that prefer the warmer drier conditions. Species that thrive in particular temperature ranges are likely to migrate from one area to another as temperature ranges change. Therefore, if Vermont has temperatures like those in Virginia in the summer, we can expect to start having the same species that reside in Virginia. In addition, first-leaf and first-bloom dates are projected to arrive around two days earlier per decade — arriving almost two weeks earlier by the end of the century.

⁴⁹ Union of Concerned Scientists, 2007. *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions*, a report of the Northeast Climate Impacts Assessment.

The impacts of climate change on Vermont and the Northeast range from temperature and precipitation changes, species shifting, including Vermont's prized sugar maple tree, to detrimental impacts on the ski industry and impacts on infrastructure, among many others. Maple syrup production is expected to be impacted in two ways. First, warmer temperatures diminish the quantity and quality of sap flow. It also shortens the tapping season and causes it to start earlier and not last as long. Second and perhaps more alarming, as the current climate in Vermont shifts northward, sugar maples may shift northward as well, leaving Vermont with a decline in sugar maple trees⁵⁰.

Invasive Species

For many pest species, rising summer and winter temperatures, and increased carbon dioxide will improve survival and growth, and in some cases increase reproduction. Trees stressed from low water availability tend to reduce their defense mechanisms and are more susceptible to insect or disease invasion. A number of examples exist to illustrate these concerns. Hemlock is susceptible to the non-native hemlock woolly adelgid. Warmer temperatures may favor winter survival of this insect in Vermont, leading to increased declines and mortality of hemlock. Emerald ash borer has been eliminating ash trees across the US and when it reaches Vermont is likely to have a significant impact on white, green, and brown ash. The Asian long-horned beetle could pose similar threats to maple trees.⁵¹

Invasive plants, native (e.g., hayscented ferns) and non-native (e.g., buckthorn and barberry), are opportunistic and respond quickly to openings in the forest canopy, whether it be from natural disturbances (e.g. wind storms), forest harvesting, or declines from forest pests. Most of these non-native invasive plants have migrated from southern New England northward, and are well suited to predicted temperature increases. Invasive plants in Vermont have also been shown to play a role in regeneration failures of native tree species. They successfully out-compete native plants and aggressively respond to disturbances that open forest canopies or disturb soils⁵². Invasive plant growth can lead to loss of native flora and fauna.

Conserving genetic diversity within native host species increases potential resiliency in light of invasive pests and other anthropogenic stresses. Several actions are needed to address non-native invasive species. Among them are preventing new introductions through common pathways such as firewood, nursery stock, and other non-local products. As an example, Vermont State Parks only allow firewood harvested within a fifty mile radius of the park to be used at campsites. While the Vermont Department of Forests Parks and Recreation recommends that firewood not be transported more than fifty miles, there are no official state regulations related to firewood used at private homes.

Other important actions needed to address non-native species include preserving the genetic resources of native species that may be impacted by invasives; working with partners to develop tools for

⁵⁰ Union of Concerned Scientists, 2007.

⁵¹ Vermont Forest Resources Plan, 2010.

⁵² Collier & Vankat; Fagen & Peart, 2004; and Webster, Jenkins & Jose, 2006; cited in Vermont Forest Resources Plan, 2010.

detecting, identifying, evaluating, and managing invasive pests; and responding rapidly if infestations are detected.

Natural Disturbances

Natural disturbances, such as native insects and diseases and extreme weather events, have always impacted forest dynamics, forest products, and services. However, the increased energy in the atmosphere resulting from climate change will lead to a greater number and frequency of severe storm events. In addition to direct damage to trees from high winds and saturated soils, these storms—as evidenced by tropical storm Irene that devastated the state in late summer of 2011—may render forest service roads, logging trails, and other critical forest management infrastructure unusable. Furthermore, catastrophic storms can result in widespread destruction of riparian forest habitat, leaving many riverbanks bare and vulnerable to colonization by invasive species such as Japanese Knotweed. Managing for natural disturbances includes continuing monitoring activities to map disturbances annually, diagnosing forest health problems, surveying changes to native and exotic pest populations, working with partners to develop management tools that reduce long-term forest health impacts, and providing education and outreach to landowners, foresters, and other groups to promote forest health goals.

Incompatible Development and Fragmentation

From 1980 until 2008, the number of Vermont housing units grew by 39%. Developed land grew 42% over a slightly shorter period (1982-2003). This increase in development was twice as fast as the State's 21% population growth.⁵³ Figure 14 – Housing Density illustrates the current pattern of development across the region, delineated as undeveloped, rural, exurban, suburban and urban. These areas are delineated based on the number of dwelling units per acre. Exurban development, occurring in piecemeal fashion, is particularly detrimental to forests as it increases fragmentation of the landscape.

From 1990 to 2007 the average value of land acreage in Vermont rose 351%—higher than the national average of 299%.⁵⁴ Real estate market growth outside of Vermont has allowed newcomers to the state to sell houses elsewhere at rates high above the cost of comparable properties here in Vermont. This purchasing power inflates the price of rural Vermont real estate and can have dramatic effects on both affordability and land use. This process is sometimes called “rural gentrification.” Rural gentrification diminishes the productivity of working lands when once-productive lands are bought up by people who do not rely on income from productive use of the land and cease to actively manage the land. Other lands are subdivided from larger parcels in production into smaller parcels which are then taken out of the natural resource economy.

⁵³ Vermont Council on Rural Development, 2011. Vermont's Working Landscape - Investing in our Farm and Forest Future: The Action Plan of the Vermont Working Landscape Partnership.

⁵⁴ Vermont Council on Rural Development, 2011.

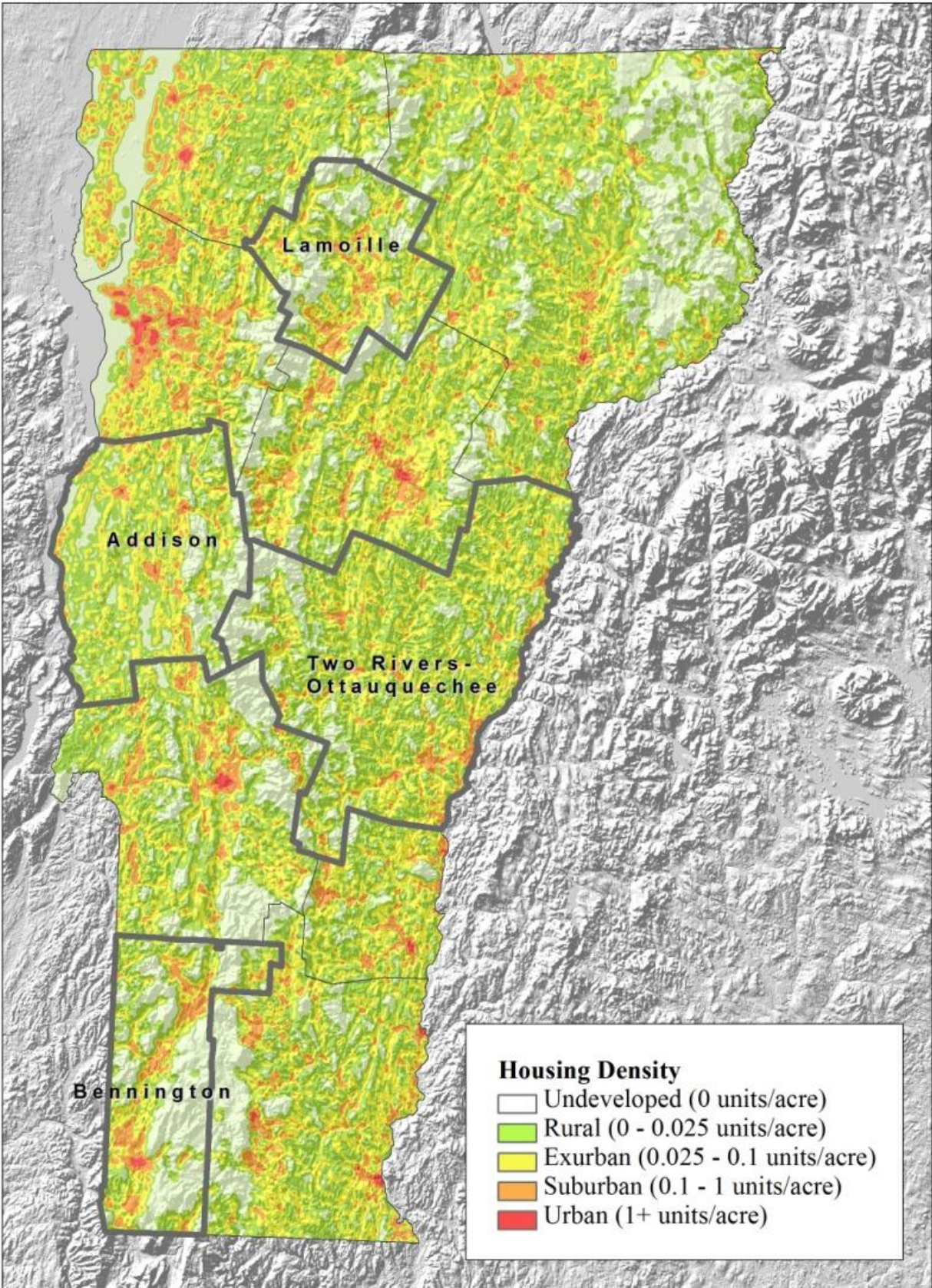


Figure 14: Housing Density

A statewide parcelization study conducted by Vermont Family Forests (VFF) and the Vermont Natural Resource Council (VNRC) indicate that the number and acreage of large (>50 acres) forest lots is decreasing. Forest land is being subdivided and mostly developed for residential use. This process results in parcelization, the fragmentation of large parcels of forest land into smaller pieces and multiple ownerships. While growth and development is beneficial in many ways, gradual parcelization can displace or destroy plant and wildlife habitat, reduce forestland's ability to provide clean air and water, and compromise the viability of large tracts of land that support the forest economy.⁵⁵

Landscapes that are fragmented by urbanization or low density development are susceptible to multiple stresses such as invasive species and altered fire regimes. Maintaining forests at both local and regional scales is critical to maintaining the full range of values from native ecosystems, including biodiversity and fresh water supplies. Fragmentation is mainly a local, yet widely dispersed phenomenon: even a small area of resource loss can effectively fragment a large total resource area. The pattern is then often repeated over large areas.

Addison

John Filoon, Middlebury College Intern, Bill Hegman, Middlebury College GIS Specialist and Regional Planning staff developed a potential indicator to track the status of forest land in each municipality in the Addison region. Land cover data is collected for the entire United States approximately every 5 years as the National Land Cover Database (United States Geological Survey, 2006). The most recent dates are 1992 and 2006 – a 14 year span. The forest cover extent from the two dates was compared for each town. In addition, core forest blocks of at least 250 acres were determined at each date and the resulting gain or loss of forest core was determined. The results show that over the 14 year study period municipal forest in over 20 acre patches averaged a 6% decrease. The municipal core forest decreased an average of 10% over the same time frame. An additional analysis was developed for each town to assess the forest cover change by Land Use Districts. The land use districts in each town were generalized into 4 categories: Village & Commercial; High Density Residential; Rural and Agriculture; and Forest and Conservation to match the land use categories in the Regional Plan. Forest in 20 acre patches decreased in almost all land use districts, but was generally the lowest in Forest and Conservation Districts. Core forest loss was clearly greatest in the Rural and Agriculture District. The Forest and Conservation Districts contained the most core forest and conversion to another land use was lowest. These results suggest that where towns have established forest and conservation districts the policies have limited conversion of forestland. However, there are large patches of forest and areas of core forest in other land use districts that should be better protected.⁵⁶ The full report and analysis is included in Appendix F.

⁵⁵ Brighton, D., Fidel, J., & Shupe, B., 2010. Informing Land Use Planning and Forestland Conservation through Subdivision and Parcelization Trend Information. Northeastern States Research Cooperative. Available from www.uvm.edu/rsenr/nsrc/projectpages/project.php?id=119

⁵⁶ Filoon, J. 2011. Analyzing Forest Change in Addison County. unpublished.

Bennington

The Bennington Region's upland forests are largely defined by vast tracts of unbroken forests. Non-forest land uses in these areas consist primarily of seasonal camps, utility lines, some telecommunication towers, and a few public and private roadways. Notable exceptions include the Bromley Mountain ski area facilities in Peru, the Carthusian Monastery and associated buildings in Sandgate, and the visitor center at the summit of Mount Equinox in Manchester. A limited amount of agricultural land can be found in upland forest landscape areas as well, the fields and pastures at the Merck Forest and Farmland Center being the most substantial.

Regional land use policies and local zoning regulations in the Bennington region severely restrict the type and intensity of new development in most upland forest areas. Two types of development that are allowed in these areas may have an effect on forest management. A relatively small impact may result if groups of seasonal camps proliferate in a given area; if the structures are dispersed throughout the forest rather than clustered along existing service roads effective management could be hindered.

Lamoille

Lamoille County faces development pressures from several different sources. As home to two of the State's largest ski resorts, the County has long been popular with second home owners, many of whom are seeking remote, forested get-a-ways. As the ski resorts seek to expand and diversify to include more four season activities, it is likely that additional recreational development will be proposed, potentially putting additional pressure on some forested areas. Lamoille and Addison County towns are in close proximity to the Greater Burlington Area. As land values and housing in Chittenden County have steadily increased, more and more workers are seeking more affordable housing in neighboring counties. Since five of the ten towns in Lamoille County do not have zoning regulations and Act250 only regulates development of ten or more housing units, much of the subdivision of land in Lamoille County is unregulated.

More substantial impacts may result from large-scale development of renewable energy resources in upland forests. Developers have expressed an Interest in commercial wind energy development involving numerous turbines on ridgelines, with supporting service roads and power lines, at locations in both the Taconic and Green Mountains. A major wind energy development is under construction on Lowell Mountain, just northeast of Lamoille County. Developers also have explored the idea of siting commercial-scale solar photovoltaic arrays in upland forest areas. These uses are not incompatible with forest sustainability, and may actually help preserve large forested parcels in single ownership, but forest management concerns should be considered along with the ecological impacts and economic benefits of such projects.

Economic Conditions

Economic Viability

U.S. timber harvest peaked in the late 1980's. Since then, timber prices and aggregate market value of wood resources have declined. These national trends are mirrored in Vermont. In 2000 Vermont forest products businesses processed 927,811 cords of wood; in 2008 they processed 584,150, a 37% drop in 8

years. The number of mills in Vermont has declined 43% from 185 in 2002 down to 105 in 2008. Mill production also dropped in half over the past decade, going from a high of 260,855 thousand board feet (MBF) in 1999 to just 133,814 Mbf in 2008.⁵⁷ (Note that some timber harvests in Vermont are unreported. These figures are intended to provide information on general trends.)

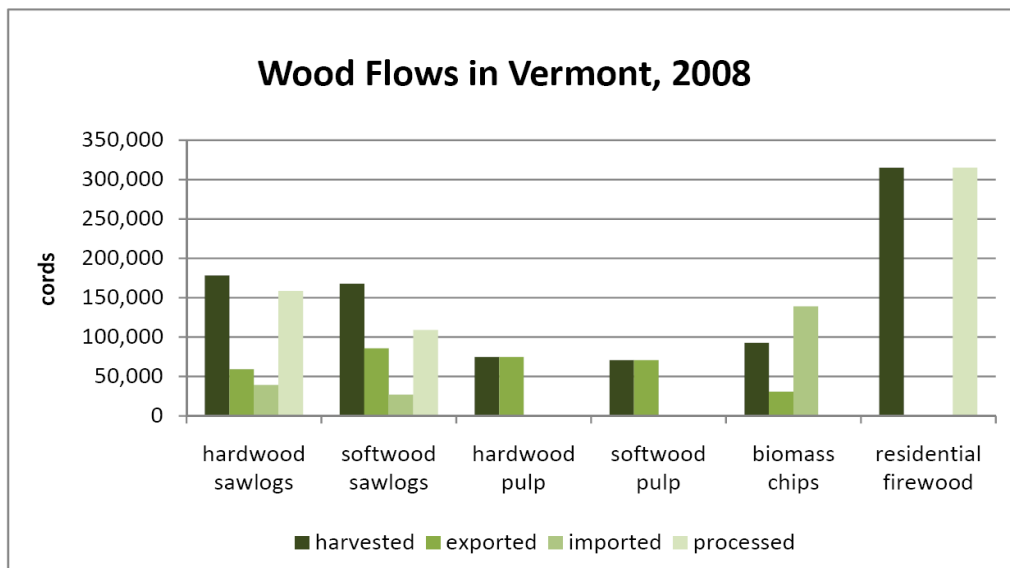


Figure 15: Flows of wood from the major categories of wood harvested in 2008, Vermont Forest Resources Plan, 2010.

Maintaining productive forest land can impose significant costs on property owners. Unless those costs can be limited and reasonable revenues realized from sustainable forest management activities, forest land owners will feel pressure to sell or convert their land to non-forest uses. The property tax levied on each acre of forest land may not be large relative to taxes on other types of property, but the cumulative tax burden resulting from ownership of hundreds or thousands of acres presents a serious challenge for most owners. Programs are available to reduce the property taxes paid by owners of forest land, but taxes remain a fixed cost of ownership regardless.

Forests have economic value, of course, and the motivation to obtain a reasonable return on these resources is in large part responsible for developing management plans for sustainable forests. Significant expenses are required to realize these returns, however, including the cost of developing and maintaining infrastructure (such as logging roads, culverts, and bridges) and ongoing operating expenses (for example, labor, equipment, and fuel expenses). Even with the UVA program, the cost of owning and managing forest land is often nearly the same as the earnings generated by timber management. Prices for various types of lumber are also fluid. Several years ago, the price of maple was high leading many landowners to cut. Landowners who resisted the temptation to cut in the interest of better stewardship have now lost value as the price of maple has declined. Similarly, as of the drafting of this plan, foresters reported that the price of spruce has declined to the point that it is not economically

⁵⁷ Vermont Council on Rural Development, 2011.

viable to harvest. However, some forest management plans call for the harvesting of spruce for ecological reasons. These examples illustrate how fluctuations in the market and the economic viability of the forestry industry can impact land management decisions.

The uncertainty of the market also impacts logging operators. During down turns in the industry, many loggers can find higher wages and more stability in other industries. The most skilled loggers are often the most likely to seek better employment opportunities. Over time, this diminishes both the size and skill of the forest industry work force.

Competing in a Global Economy

The new global economy has built commodity structures and competition that have dramatically challenged the viability of Vermont farm and forest enterprises. Vermont's natural resource economy is not only challenged to compete with lower production costs elsewhere, but also with subsidies and supports in other states and countries that make for an uneven playing field. At the same time, the global economy offers opportunities to build on key natural resource assets and to leverage the Vermont brand. Vermont has not fully capitalized on its advantage of having a market of 65,000,000 people within a day's drive.

The Interstate 91 corridor represents a major transportation route of raw timber to Canada and finished products to the United States. Much of the millable timber harvesting in Vermont is now exported along this corridor to Canada for processing. This trend is likely to continue absent changes in economic conditions and international trade policies beyond the control of the State of Vermont. A result of this shift is that larger amounts of timber need to be harvested to be profitably shipped to Canada. This creates a barrier for smaller landowners who have less timber to manage and market.

Tools for Sound Forest Stewardship and Conservation

The importance of protecting the viability of forest resources has been recognized for many years and various complementary conservation strategies have been developed and employed. Existing conservation measures generally fall into three categories:

- Some form of investment, by a public entity or private conservation organization, that secures a specified level of interest in a property;
- Local or state land use and environmental regulations that limit alternative uses of all or a part of a property; and
- Economic development assistance that supports continued forest resource uses of a property.

Public Conserved Lands

The most straightforward, although often the most expensive, way to conserve valuable forest land is through outright purchase of the land by a public or private entity. Forest ownership in Vermont is primarily private. Over 80% of the forested land is owned by individual, families or corporate entities. Public ownership of forested land is split about equally between the federal government and state and local governments (Figure 16). The major public conserved landholdings for each region are briefly summarized below. A more comprehensive and detailed list and description is given in the individual

regional forest stewardship plans.

Addison

Public ownership in Addison County totals about 103,100 acres or about 20% of the county. The vast majority of these publicly-owned lands are forested. Of the county's public lands, the USDA Forest Service owns approximately 84%, Vermont Agency of Natural Resources owns about 12%, and municipalities own about 3% percent. While some land has changed hands from private to public or vice versa in recent years, and the GMNF does occasionally purchase land offered by willing sellers that will benefit National Forest System purposes, patterns of public ownership in the region are relatively stable.

Other large blocks of public forest land in the Addison Region are primarily State Wildlife Management Areas (WMAs) under the management of the VT Fish & Wildlife Department. Fish and Wildlife owns 86 WMAs, totaling over 130,000 acres throughout Vermont. Addison County is fortunate to host 10 WMAs, totaling over 11,000 acres plus easements on some adjacent lands. Management of these areas emphasizes the conservation of wildlife and their habitat, and provides people with opportunities to enjoy these resources through outdoor activities. Commercial logging operations are allowed on some of the WMA land to improve habitat. Logging workshops are held in collaboration with other partners to demonstrate harvest techniques designed to improve wildlife habitat, including practices such as retaining snags and den trees, use of portable skidder bridges instead of poled fords, and retention of forested buffers on streams and vernal pools.

Bennington

The United States government owns 205,817 acres of land in the Green Mountain National Forest within the Bennington region and manages the forest resource to support specified public objectives (recreation, timber production, and protecting wildlife and important natural areas). The State of Vermont and several towns own and manage smaller forest parcels. The region also includes three state parks and several small local recreational parks. Most of the federally owned land lies in the region's upland forest landscape areas, while town and state owned forest parcels are scattered throughout the region, but concentrated in rural valley locations. Municipally owned parks and recreational forest lands are found in and near town and village centers. Public ownership of these lands allows them to be managed and available for public use, but concerns are raised over reduced public revenues (property taxes) to support them.

Lamoille

A large percentage (nearly 20% or 60,000 acres) of land in Lamoille County is conserved land owned by the State. Mt. Mansfield State Forest is the largest contiguous landholding owned by the Vermont Department of Forests, Parks and Recreation and one of its most diverse. The forest consists of 39,837 acres and spreads into the counties of Chittenden, Lamoille and Washington. It is located in the towns of Bolton, Cambridge, Johnson, Morristown, Stowe, Underhill and Waterbury (VTANR, 2002). The forest is located north of U.S. Route 2 and U.S. Interstate 89, west of VT Route 100 and south of VT Route 15. A management plan was created for Mansfield State Forest in 2002, addressing a broad range of issues including timber resources, recreational use, and the protection of natural resources. Other notable

state lands in Lamoille County include CC Putnam State Forest (13,355 acres), Elmore State Park (940 acres), and Green River Reservoir (5,110 acres).

Town Forests, or forest land owned and managed by a municipality, conserve forest land while providing recreational benefits, wildlife habitat, and in some cases, revenue for Town governments. Town Forests were originally developed as part of a statewide effort to reforest the State and promote good forest management practices. Town Forests in Lamoille County include the Gomo Town Forest in Johnson, the Morristown Municipal Forest, Moss Woods in Hyde Park, and Sterling Forest in Stowe. Management of Town Forests varies from community to community and often reflects the goals and vision of the local community. Some communities may use their Town Forests primarily for recreation, while others may emphasize wildlife conservation. Still others may manage their Town Forests primarily for revenues. Some municipal forests in other regions are managed to provide affordable fire wood for low income residents. At times the different uses of Town Forests may conflict; for example, providing revenues through timber sales may conflict with promoting recreation. Each town should develop policies to address these potential conflicts.

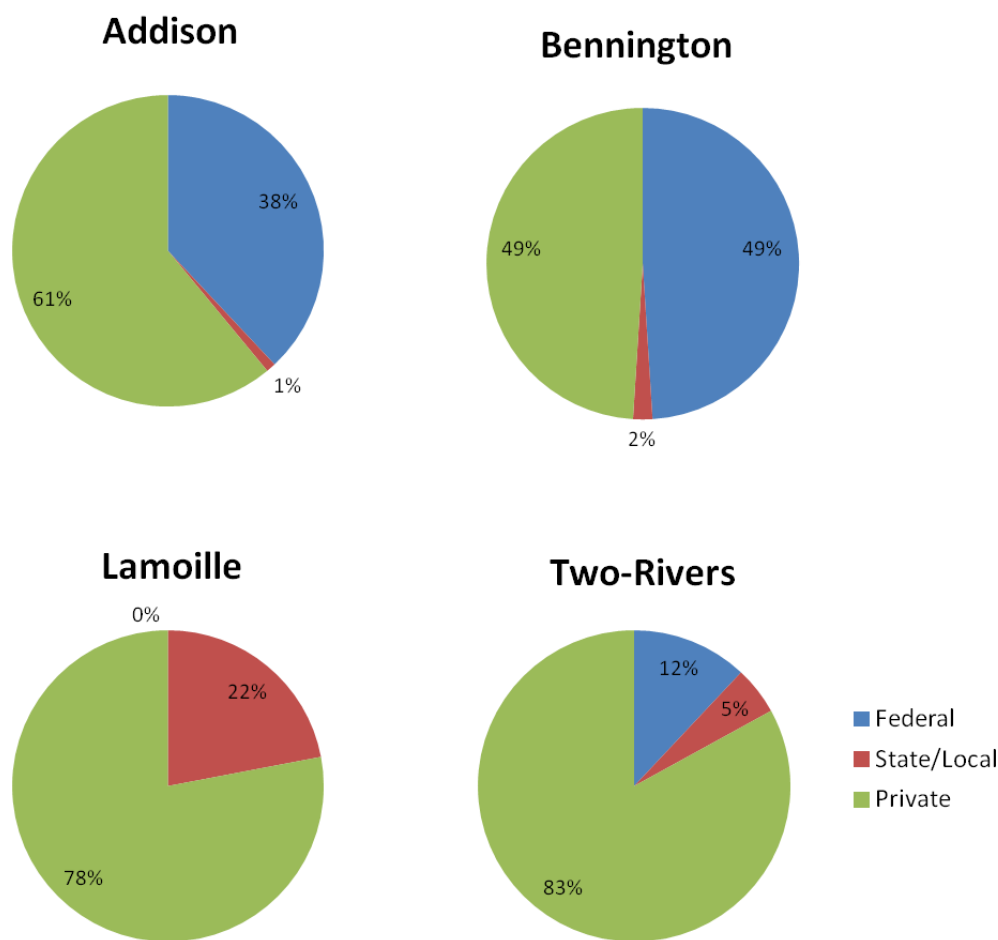


Figure 16: Forest Ownership, USDA Forest Service, Forest Inventory and Analysis, 2010.

Two Rivers-Ottauquechee

With over 400,000 acres, the Green Mountain National Forest (GMNF) constitutes the largest contiguous public lands area in Vermont. It is spread across central and south-western Vermont, and is located within several towns in the region including Woodstock, Rochester, Hancock, Pittsfield, Stockbridge, Granville, Bridgewater, Pomfret, Hartford and Norwich. The lands are managed by the USDA Forest Service.⁵⁸ Home to portions of the Long Trail, Appalachian Trail, and the Robert Frost National Recreation Trail, the GMNF is a popular outdoor recreation destination.

The Two Rivers-Ottauquechee region includes the large Coolidge State Forest in the south (located in Plymouth, Bridgewater and Woodstock), as well as six state parks. Several large Wildlife Management Areas are scattered throughout the region, including several in Strafford and the large Les Newell WMA in the Chateaugay area (in the towns of Barnard, Bridgewater, Sherburne and Stockbridge). Additionally, town forests are owned by West Fairlee, Fairlee, Randolph, Royalton, Corinth and others.

Private Lands

Conservation Easements

A conservation easement is a legally binding agreement between a landowner and a government agency or land protection organization (land trust) that ensures a parcel will be protected indefinitely from certain types of development. Conservation easements are typically created to conserve farm or forest lands, to protect ecologically sensitive areas, or to protect land that has particular importance to an individual, family, or community. Easements are sometimes donated but can also be purchased. A trust may own different types of property rights for various parcels of land, including “fee simple absolute” [all of the property rights relating to a specific parcel of land], conservation easements or and development rights and may acquire these rights by purchase or by donation.

In addition to limiting or precluding development of a parcel, conservation easements generally specify acceptable management standards and protection of certain functions of the land, while allowing the holder of the remaining rights in the land to use the land for other purposes. This is an especially useful tool in managing connecting lands, riparian lands, and lands adjacent to conserved natural areas.

Vermont Land Trust (VLT) is non-profit land conservation organization providing technical and legal assistance to individuals, communities, and local land trusts to help them achieve their conservation objectives. There are numerous local and regional land trust organizations whose purpose is the protection of land resources (wildlife habitat, popular trails, scenic views and open space) through conservation easements. Some notable private conservation projects for each region are briefly summarized below. A more comprehensive and detailed list and description is given in the individual regional forest stewardship plans.

Addison

⁵⁸ U.S. Department of Agriculture, Forest Service, “About the Green Mountain National Forest.” Website: http://www.fs.fed.us/r9/forests/greenmountain/htm/greenmountain/g_about.htm (accessed June 11, 2012).

In the Addison Region, the VLT since 1977 has conserved 191 farms, for a total of 49,406 acres. This year saw new protected parcels in Addison, Bridport, Cornwall, Shoreham and Waltham.⁵⁹ The VLT has focused on agricultural lands in the Champlain Valley, but many of the properties also have clay plain forests and forested riparian lands.

The Middlebury Area Land Trust (MALT) is a private, nonprofit organization that works to permanently conserve productive, recreational and scenic lands that are important to the economy and environment of Middlebury and its surrounding areas. MALT works closely with landowners, municipalities and the regional planning commission, as well as other land trusts in the area, including the Vermont Land Trust and the Lake Champlain Land Trust. State agencies and private organizations participate in conservation programs to fund the acquisition of land and property rights to conserve the natural areas functions of those areas. In addition to the Trail Around Middlebury (TAM), MALT has been involved in the conservation of over 2300 acres of land, farms, forests, wetlands and recreational areas. They hold 14 easements and own three properties outright. They offer educational and recreational opportunities for all ages through sponsored hikes and naturalist talks, and support several school projects from elementary to college level by providing outdoor classrooms.⁶⁰

Bennington

Important forest lands are owned by private non-profit organizations in the Bennington region. Large tracts of privately held forest land, conserved for public benefit, are found in Rupert (Merck Forest and Farmland Center), Manchester (Equinox Preservation Trust), and Bennington (Mount Anthony Preservation Society). In addition, The Nature Conservancy owns unique forest land such as the Canfield Pines in Arlington, the Equinox Highlands, the Mount Aeolus bat cave in Dorset, and Quarry Hill in Pownal. These privately conserved parcels are supported by foundations and memberships dedicated to their conservation. Nearly all of these properties are found in upland forest landscape areas; whereas most of the land protected by conservation easements is located in the rural valleys.

Lamoille

The Vermont Land Trust was active in the conservation of the **Atlas Timber Lands** in Eden. This area encompasses 26,789 acres of forestland, now the second largest timberland holding in Vermont. 8,035 acres lie within Lamoille County. The goal of the Atlas Timberlands Partnership is to sustainably manage timber stock while protecting the land's ecological integrity and encouraging public access for recreational activities.

The Stowe Land Trust is an active local land trust in the Town of Stowe. Since its creation in 1988, the organization has completed 28 conservation projects, five of which are owned and managed by the Stowe Land Trust, and has conserved over 3,200 acres. Currently, the Stowe Land Trust is the only active local land trust in Lamoille County, although residents of several other communities have expressed interest in developing a Local or Countywide Land Trust. Smaller communities may have

⁵⁹ Suozzo, A. (2011). Trust Keeps 1500 Acres -of Farmland Open in 2010. Addison Independent. Accessed 2011, from <http://www.addisonindependent.com/201012trust-keeps-1500-acres-farmland-open-2010>

⁶⁰ Middlebury Area Land Trust. (2011). Accessed 2011, from www.malt.org.

difficulty maintaining the resources and expertise necessary to administer a Land Trust which must raise funds and draft and oversee easements. Even if it is impractical for a community to develop its own land trust, local residents can still play a vital role in land conservation by informally discussing conservation with willing landowners, identifying landowners who might be interested in conserving their land, and raising funds for conservation purchases.

Two Rivers-Ottawaquechee

The **Upper Valley Land Trust** (UFLT) assists landowners with the conservation of their lands, whether those lands are in the form of working farms or forests, wildlife habitat, or even trails and scenic views. Efforts are focused on the upper Connecticut River Valley, which includes the majority of towns in the TRO region, as well as several cities in New Hampshire. Specific activities include developing, monitoring, and enforcing permanent conservation easements, as well as engaging communities through education and outreach. UFLT works with conservation commissions, neighborhood organizations, and landowners to accomplish their work.⁶¹

There are a few noteworthy conservation projects in the TRO region:

- **Taylor Valley:** Taylor Valley is a forested area of approximately 18,000 acres that spans Chelsea, Vershire, Tunbridge and Strafford. Conserved by The Nature Conservancy, the area is managed by the Taylor Valley Conservation Project, which includes private landholders as well as members of the community who want to maintain “an ecologically rich and productive area for future generations.”⁶²
- **Chateaugay No Town (CNT):** The CNT Conservation Project spans more than 60,000 conserved acres across the towns of Barnard, Bridgewater and Stockbridge (in the TRO area), as well as Killington (outside the TRO area). Town representatives convened the project in 1997 to encourage voluntary conservation of private lands in order to maintain current wildlife habitats and promote sustainable forestry, among other objectives⁶³
- **Orange County Headwaters (OCH):** The OCH project was started by landowners in Washington and Corinth who were interested in conservation. Through the Vermont Land Trust and the Upper Valley Land Trust, 31 OCH landowners have conserved 4,500 acres. Much of this land is forested.⁶⁴

Forest Stewardship Potential of Private Lands

A large proportion of Vermont is forested and most of these woodlands are privately owned by over 80,000 individual landowners. Thus the individual land owners play a vital role in keeping Vermont forests healthy and a high quality habitat for Vermont wildlife for the present and into the future. Private landowners are finding ways to manage their land and keep their resources and services intact.

⁶¹ Upper Valley Land Trust, “About Us: Conserving Special Places,” 2010. Website: <http://www.uvlt.org/aboutus> (accessed June 12, 2012).

⁶² Tunbridge, Vermont, “Out and About in Taylor Valley,” 2010. Website: <http://www.tunbridgevt.com/out-and-about-in-taylorvalley/> (accessed June 11, 2012).

⁶³ Two Rivers-Ottawaquechee Regional Commission, “Conservation: Chateaugay No Town (CNT) Conservation Project.” Website: <http://www.trorc.org/consent.html> (accessed June 11, 2012).

⁶⁴ Vermont Land Trust, “Orange County Headwaters: Sustaining Forestry...Engaging a Community,” 2006-2007. Website: <http://www.vlt.org/news-publications/publications-archive/archived-articles/orange-county-headwaters> (accessed June 12, 2012).

The Use Value Appraisal (Current Use) program, sale of easements, creation of cooperatives, and sustainability certifications are all strategies that can help. Municipalities can also work, through their planning and zoning processes, to balance growth in some areas with conservation and management of larger tracts of the working landscape in other locations. These strategies will be examined in greater detail in subsequent sections of this report.

The Vermont Department of Forests, Parks Recreation developed an analysis of stewardship potential for private forest lands as a part of their Forest Resources Plan. A map was developed as a product of the Vermont Forest Stewardship Spatial Analysis Project (SAP) to determine the potential for stewardship of private forest lands in Vermont. Spatial data were used to indicate non-industrial private forest lands where stewardship could be encouraged or enhanced. Lands with high stewardship potential are considered priority areas for the Forest Stewardship Program of the USDA as well as for more concentrated conservation, management, and associated planning efforts. This project identified 10 factors that play a key role in influencing suitability for forest stewardship. Factors that threaten forest resources include development (conversion to non-forest uses) and forest health (risk and adaptability to change). Factors that support the potential of forest resources include forest patches, slope, wildlife and biodiversity, riparian corridors, wetlands, priority watersheds, and proximity to publicly-owned lands. Using a raster-based GIS analysis, 30 x 30 meter grid cells were assigned values based on each of the 10 parameters to determine their individual forest stewardship potential or threat. Then the importance of each of these factors was ranked as high, medium or low and the results were combined in a GIS overlay analysis. The final product is a single data layer, shown in Figure 17, which represents the suitability of the land for further stewardship efforts, scored from 3 (high potential for forest stewardship) to 1 (low potential)⁶⁵ The analysis results are briefly summarized below for each region. It should be noted that since the data layer is based on a statewide analysis, the scale may be too coarse to be useful for a regional interpretation. In fact, all regions in this report reflected high to moderate levels of stewardship potential throughout their regions.

⁶⁵ Vermont Dept of Forests, Parks, and Recreation. (2007). Vermont Methodology, September 2007. Forest Stewardship Analysis Project [unpublished]. Accessed 2011, from <http://www.fs.fed.us/na/sap/products/VT/VT-Methodology.pdf>.

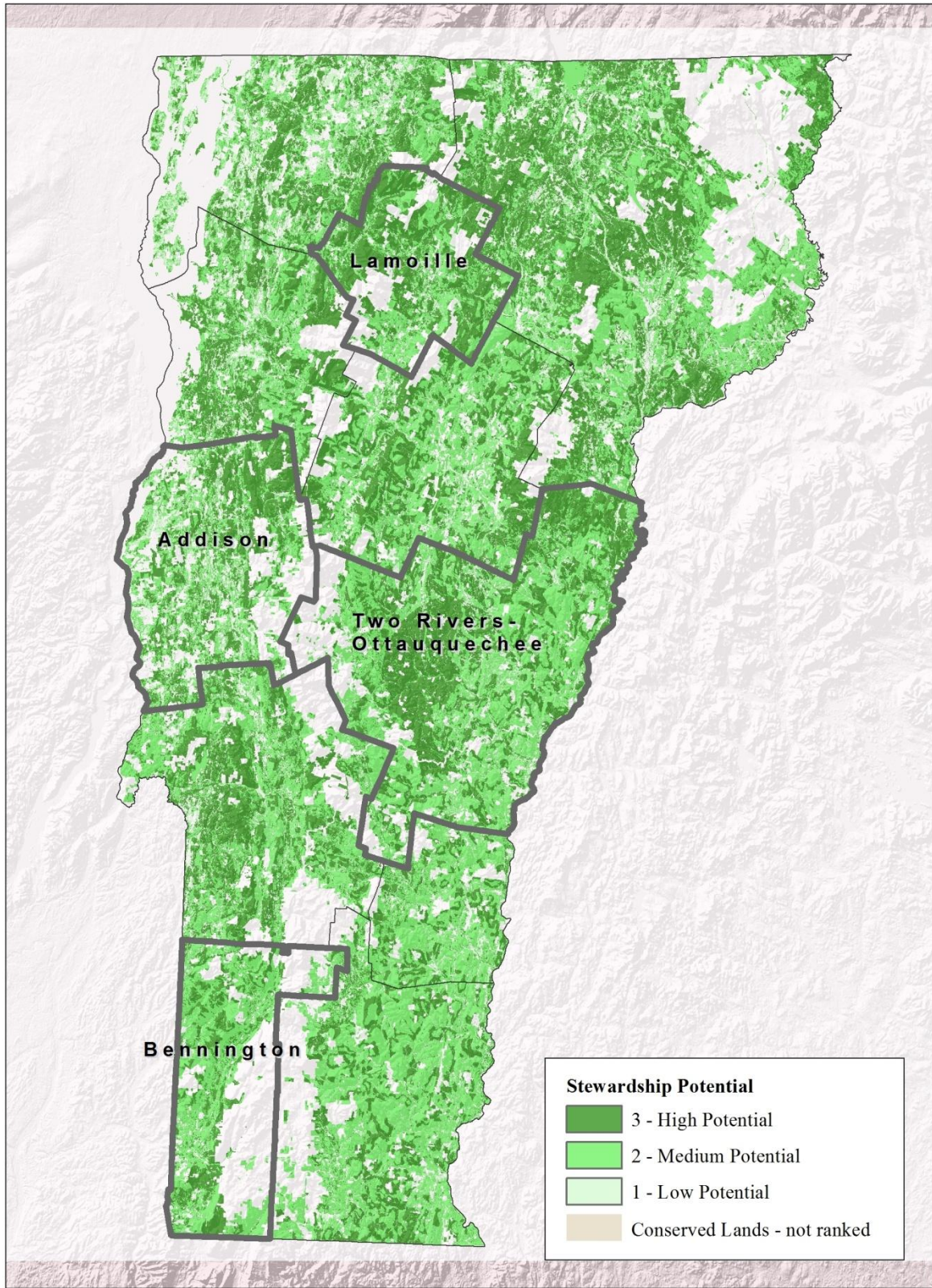


Figure 17: Forest Stewardship Potential, from Vermont Spatial Analysis Project, Department of Forests, Parks and Recreation, 2010.

Addison

In general, forest stewardship potential is reflected as high to moderate throughout the region. The Green Mountain and the Champlain Valley both reflect good forest stewardship opportunity. Higher potential is shown in many of the areas that are currently maintained as forestland. The challenge will be to maintain this status into the future. The stewardship potential index also identifies moderate or high areas of forest potential in regions that are currently in agriculture or adjacent to growing communities. Good forest land may also be desirable for agriculture or housing, both land uses that command a higher land value.

Bennington

It is interesting to observe that while the “high potential” stewardship lands are found in all landscape types, many are found in rural valleys and near population centers where competing uses may pose challenges for conservation and forest management. Additional threats derive from variety of sources including airborne pollutants, climate change, invasive species and pests, fragmentation of blocks of forest land, and economic conditions that make productive management of forests difficult.

Lamoille

The resulting map shows high to moderate forest potential throughout the region. Areas with high potential include most of the uplands in Cambridge, Waterville, Belvidere and Eden, as well as significant portions of Wolcott, Elmore and Johnson. A large proportion of these areas are currently enrolled in the Use Value Program. The Stewardship Potential also identifies moderate or high areas of forest potential in regions that are currently in agriculture or adjacent to growing communities. Good forest land may also be desirable for agriculture or housing, both land uses that command a higher land value.

Two Rivers-Ottawaquechee

One can see moderate to high forest stewardship potential throughout the region. Areas with high potential include most of the White River Watershed towns of Randolph, Bethel, Royalton and Barnard, as well as the uplands in Topsham, Newbury and Corinth. SAP also identifies moderate or high potential in regions that are currently used for agriculture or adjacent to growing communities.

Regional Plans

Most of the Regional Plans in Vermont discuss forests and forestry related issues within a Natural Resources section. Each of the four regions examined their current respective regional plans to analyze the degree to which those plans addressed forest related issues and the protection of forest resources, and how those plans might be strengthened. One of the primary objectives of this project was to use the information gleaned from the research and the Steering Committee meetings to better inform and thereby strengthen the treatment of forests in Regional Plans. In turn, a comprehensive discussion of forest stewardship in Regional Plans can better support sound forest stewardship policies at the local level.

One primary way that Regional Plans address the protection of forests and forest resources is through land use policies and recommendations. Generally, Regional Plans include a map of future land use, which tends to be a composite of all municipally adopted municipal zoning or land use districts. The

future land use map included in Regional Plans attempts to depict the Land Use regions adopted by each municipality in broad categories. Although these categories vary regionally, some widely accepted categories include the following examples: Village, Commercial and Industrial Regions; High Density Residential Regions of 2 acres or less; Rural and Agricultural Regions of greater than 2 acre density, and Forest/Conservation Regions. Forest/Conservation Regional Planning districts generally include high elevation and remote forested areas. Most towns use these regions to promote open space, recreational opportunities and significant natural features.

Regional Plans do not have prescriptive land use policies but rather defers to the land use policies of individual municipalities. Each of the Regional Plan elements contains a set of regionally adopted Goals, Objectives and Recommended Actions. These are the policies the Regional Commission will use in Act 250 and Act 248 proceedings. The Regional Plans land use policies and map(s) provides the framework for the detailed local land use regulations and for town plans. The Goals, Objectives and Recommended Actions for forest stewardship as written in each region's Regional Plan are listed or summarized in the individual regional forest stewardship plans.

Each region involved in this project is committed to using the information and strategies gleaned from their forest stewardship plan to revise the Forest element of their respective Regional Plans. Proposed changes include:

- Goals and strategies that address the challenges to sound forest stewardship
- Updates to forestry health, ecologic and economic data
- Inclusion of landscape based forest stewardship maps, as space allows
- Recommendations for Regional Planning Staff to do outreach, using a systematic approach, to municipal officials on forest issues prior to updating town plans or zoning regulations

Local Plans and Land Use Regulations

The Vermont Natural Resources Council recently created a matrix (Strategies Guide for Forestland and Wildlife Conservation Matrix⁶⁶) that summarizes regulatory and non-regulatory tactics for the conservation of forest land, and will soon publish a more extensive guide for town officials who wish to explore and implement policies aimed at keeping forests as forests. Using the VNRC's outline of important strategies, each region reviewed Municipal Plans and Land Use Regulations of their respective towns and extracted language pertaining to the following strategies discussed in the matrix:

- Conservation/ Forest Reserve District
- Planned Unit Development
- Subdivision Regulations
- Site Development Standards
- Ensure Forest Products Industries are allowed in the Community
- Forest Practices
- Definition of Important or Significant Resources
- Education (non-regulatory)
- Map and Inventory Forest Lands, Wildlife Corridors (non-regulatory)
- Other/Goals

⁶⁶ Vermont Natural Resources Council, 2011. Strategies Guide for Forestland and Wildlife Conservation Matrix.

VNRC's strategy matrix template is attached to this plan as Appendix E. A discussion of municipal plan language pertaining to strategies listed in the VNRC matrix can be found in the individual Regional Forest Stewardship Plans.

Local Conservation Commissions and other Conservation Organizations

The role of conservation commissions and statewide conservation organizations are described in this section. The regional Forest Stewardship Plans list and describe region specific organizations.

Conservation Commissions

Conservation Commissions are an important community organization to help guide policy concerning forest land, wildlife and other natural resources. Conservation commissions may make an inventory and conduct continuing studies of the natural resources, historic, educational, cultural, scientific, architectural, or archaeological value of the municipality. A Commission may make recommendations to the municipal governing body, assist in the review of development proposals, receive donations and funding and administer lands which the municipality owns. Some Conservation Commissions are involved in local planning efforts, such as review of the "Natural Resources" section of a town plan.

A Conservation Commission can be the catalyst and organizer of efforts to develop public awareness and support for forest blocks. A municipality also can establish special advisory committees and can work with local and regional advocacy groups [such as watershed associations] and local chapters of State and national organizations on behalf of a particular natural area or conservation issue.

Vermont Coverts: Vermont Coverts works to enhance wildlife habitat and promote healthy forest stewardship practices among private landowners in Vermont. The group educates forest owners on how to draft and implement a sound management plan. Part of this work involves hosting workshops on forest management and working with landowners through personal contacts. Vermont Coverts also represents its constituency among State agencies and other forest and wildlife related groups.⁶⁷

Staying Connected Initiative: **Staying Connected** is an initiative to help safeguard wide-ranging and forest-dwelling wildlife such as bear, moose, lynx, marten,, and bobcat from the impacts of habitat fragmentation and climate change by maintaining and restoring landscape connections across the Northern Appalachians region. The Initiative focuses on seven priority areas across the Northern Appalachians, including three areas in Northern Vermont – the Northern Green Mountains (VT-Canada), Worcester Range to the Northeast Kingdom (VT), and the Northeast Kingdom to Northern New Hampshire to Western Maine mountains (VT-NH-ME).⁶⁸

University of Vermont Land Stewardship Program (LANDS): UVM Lands places teams of student interns from the Rubenstein School of Natural Resources with organizations such as land trusts, conservation

⁶⁷ Vermont Coverts: Woodlands for Wildlife, "Mission," 2009. Website: <http://www.vtcoverts.org/> (accessed June 12, 2012).

⁶⁸ Staying Connected Initiative, Improving Habitat from New York to Maine. Website: <http://www.stayingconnectedinitiative.org/> (accessed June 12, 2012).

commissions, and other land management organizations. In cooperation with the organization, students undertake projects such as natural and cultural resource inventories, development of management recommendations, GIS analysis, invasive species identification and mapping, and educational outreach.

Forest Product Associations

Logger Education to Advance Professionalism (LEAP): The purpose of the Vermont LEAP program is to promote a professional approach to logging by providing the knowledge necessary for loggers to work safely, efficiently, and in an environmentally conscientious manner while harvesting timber in Vermont. LEAP certification is a formal training program for loggers that includes practice courses in managing and using forest ecosystems, professionalism in forestry, and equipment handling and safety.

Vermont Wood Manufacturer's Association (VWMA): The VWMA is an organization with more than 120 primary and secondary wood processors as its members. "VWMA's mission is to support the industry in Vermont and promote its long-term viability by expanding members [sic] presence in the marketplace, ensuring a sustainable supply of raw materials, increasing workforce skill and acting as responsible employers and community members."⁶⁹ Accordingly, the VWMA maintains a website on which its members can post profiles of their company and wood products. They also helped publish "The Essential Buyer's Guide" to wood products manufactured in Vermont. Additionally, the VWMA offers educational workshops and discounts on events throughout the state. Finally, the VWMA sponsors the annual Vermont Fine Furniture & Woodworking Festival in Woodstock, VT. At the festival, woodworkers can show off their forest products or art, and demonstrations of woodworking are offered at the Marsh-Billings-Rockefeller National Historic Park.

Vermont Wood Products Marketing Council: The Vermont Wood Products Marketing Council works to promote the quality and craftsmanship of Vermont wood products so that residents and nonresidents may increase their awareness of the outstanding design of the products, the environmental sensitivity of the manufacturers, and their commitment to customer satisfaction. The Wood Products Marketing Council has developed the "**Vermont Quality Wood Products**" brand and logo. The Council has also created the **Essential Buyers Guide for Vermont Wood Products**, which allows readers to view furniture, wooden ware, toys and games, building supplies, carvings, and architectural wood products from over 100 Vermont wood artisans. **The Cornerstone Resource Manual** connects architects, designers, and purchasers with Vermont producers and crafts people. Several Lamoille County based companies are listed in these manuals. The Vermont Wood Products Marketing Council is also the organizer of the **Vermont Forest Heritage Trail**.⁷⁰

Vermont Forest Products Association (VFPA): The Mission of the VFPA is to promote and defend the interests of our members. VFPA represents all aspects of the forestry community and the member businesses and individuals that are located throughout the State of Vermont. VFPA meets its mission through:

⁶⁹ Vermont Wood Manufacturers Association, 2012. Website: <http://www.vermontwood.com/home> (accessed June 11, 2012).

⁷⁰ Vermont Wood Products Marketing Council, 2011. Website: <http://www.vermontwood.org/> (accessed June 11, 2012).

- Information and continuing education to its members Public outreach and education
- Working with other organizations through partnering and coalition building
- Networking with others within the forest products industry.
- Lobbying state and federal government officials and lawmakers⁷¹

Vermont Maple Sugarmakers Association: The Vermont Maple Sugar Makers' Association mission is to safeguard the tradition of maple sugarmaking while maintaining the highest standards of production and product quality. The VMSMA works with local maple sugarmakers, the Vermont sugarmakers, the Vermont Agency of Agriculture Food and Markets, the United States Department of Agriculture, and international agencies and non-government organizations to protect the integrity and purity of maple syrup. The VMSMA educates consumers by providing information on how maple syrup is made, its nutritional value, how to cook with it, and promotes visits to sugar houses where the public can watch maple syrup being made. As maple sugarmaking is intertwined with Vermont's culture and history the VMSMA works with its related organization, the non-profit Vermont Maple Foundation to provide demonstrations, arranges visits and events, and presents the story of Vermont maple sugarmaking.⁷²

Vermont WoodNet: Vermont WoodNet, Inc., is a non-profit organization established to address the needs of small-scale Vermont wood product businesses that produce "Vermont Made" products by creating opportunities for education, joint manufacturing, joint marketing, and increased access to materials and services. Vermont WoodNet provides an online directory which connects wood product businesses with other Vermont businesses that provide services they may need (for example kiln drying and tool and equipment suppliers). Vermont WoodNet also provides a list of Vermont companies that produce and sell Forest Stewardship Council Certified products.

Private Landowner Associations

Vermont Family Forests (VFF): VFF is a non-profit family forest conservation organization that promotes conscientious forest stewardship to maintain natural ecosystem health. The organization developed the "Forest Health Conservation Checklist" which outlines 43 practices that ensure ecologically sustainable management. This checklist leads to certification -- a forest can be a "VFF Verified Forest" and can utilize different branding tools, including "NeighborWood" for firewood and "Family Forest" for flooring and other products.⁷³

Vermont Woodlands Association (VWA): Vermont Woodlands Association is a private non-profit whose mission is to advocate for the management, sustainability, perpetuation, and enjoyment of forests through the practice of excellent forestry that employs highly integrated management practices which protect and enhance both the tangible and intangible values of forests. VWA objectives are to communicate the benefits of working forests, to recognize exemplary actions of woodland owners and managers, to provide educational opportunities, and to represent its membership before governmental bodies. Vermont Woodlands Association provides a variety of educational programs, including

⁷¹Vermont Forest Products Association, 2012. Website: <http://vtfpa.org/>

⁷² Vermont Maple Sugarmakers Association, 2012. Website: <http://vermontmaple.org/>

⁷³ Vermont Family Forests, 2012. Website: <http://www.familyforests.org/>

workshops, woodland tours, and a “Forestry School.” Vermont Woodland Association also provides technical briefs and printed materials. Vermont Woodlands Association oversees the Vermont Tree Farm Program.

Vermont Tree Farm Program: Sponsored by the American Forest Foundation, the national Tree Farm program promotes native, working forests, while receiving advice from leading foresters and environmental specialists. In Vermont, the Tree Farm program is overseen by the Vermont Woodlands Association’s Board of Directors. This program provides third party certification through the international Programme for the Endorsement of Forest Certification (PEFC); the certification requires farms to meet sustainable management standards. In November 2011, there were 424 Certified Tree Farms in Vermont, managing approximately 167,182 acres.⁷⁴

Advocacy Organizations and Associations

Vermont Trappers Association: The Vermont Trappers Association is an organization of trappers dedicated to conserving wildlife and preserving outdoor heritage for future generations of outdoorsmen and women. It encourages controlled harvest of wild fur bearing animals to maintain healthy populations within the carrying capacity of the environment. It provides trapper education emphasizing the most humane techniques in harvesting fur bearers and giving special consideration to conservation of wildlife species. The Association also provides networking opportunities for trappers, including an annual fall rendezvous and spring fur auction, an online market for fur pelts, and training on trapping practices and etiquette. Several of the Association’s officers are residents of Lamoille County.

Vermont Natural Resources Council (VNRC): The VNRC is a non-profit environmental advocacy organization and the Vermont-based wing of the National Wildlife Foundation. While the group works to address several environmental issues (including energy, water, air, etc.), VNRC’s Healthy Forests Program is especially strong. “Recovery of threatened and endangered species, wilderness, ecological reserves, and sustainable forestry are key conservation components in VNRC’s forest program.” Most notably, VNRC coordinates the Vermont Forest Roundtable with stakeholders from across the state to discuss threats to forests and brainstorm recommendations to ensure a sustainable future.

Vermont Council on Rural Development (VCRD): The Vermont Council on Rural Development (VCRD) is a non-profit organization dedicated to the support of the locally-defined progress of Vermont’s rural communities. Currently, the Vermont Working Landscapes Partnership is a major initiative of the VCRD. The Working Landscapes Partnership is a non-partisan and broad-based effort to support local agriculture and forestry, grow and attract farm and forest entrepreneurs, and conserve Vermont’s Working Landscape far into the future.

Center for Northern Woodlands: The mission of the Center for Northern Woodlands education is to advance a culture of forest stewardship in the Northeast and to increase understanding of, and

⁷⁴ Vermont Tree Farm Program, “About Tree Farm.” Website: <http://www.vermontreefarm.org/about.asp> (accessed June 11, 2012).

appreciation for, the natural wonders, economic productivity, and ecological integrity of the region's forests. Programs of the Center for Northern Woodlands include **Northern Woodlands Magazine** – a quarterly magazine for landowners, forestry professionals, conservationists, and outdoor enthusiasts; **Northern Woodlands Goes to School** - a program that provides place-based environmental education resources to educators in our region who want to connect their students to the outdoors; **The Outside Story** - a weekly column on forestry subjects, natural history, and ecology syndicated in dozens of newspapers and now a book of the same name; and **The Place You Call Home** - a magazine format owner's manual geared to particular regions or states. The Center for Northern Woodlands is currently working on a publication for woodlot owners titled: **More Than a Woodlot: Getting the Most from Your Family Forest**.

Additional Forest Stewardship Strategies

Land Use Regulations

While forestry practices are generally exempt from local Land Use Regulations, local regulations can have an impact on the land base available for forestry as well as on the industries necessary to support the forestry economy. While this Plan will list regulatory tools available to communities, it is important to note that individual communities must decide which tools are most appropriate for their local circumstances. The Regional Planning Commissions will assist communities in determining which tools may be most appropriate and in developing Land Use Regulations language, but they do not seek to require or impose regulations upon local communities.

Develop Alternatives to Large Lot Zoning

As noted elsewhere, fragmentation and parcelization of forest land can make it more difficult to manage a forest be it for timber production, wildlife, recreation, or any other use. Local Land Use Regulations can play a role in both encouraging and discouraging forest fragmentation.

Many communities rely on "Large Lot Zoning" to control densities in rural areas. Large lot zoning often refers to practices that require multi-acre lots for each residential structure. While large lot zoning can effectively reduce the overall density within a forested area, it may also result in unnecessary fragmentation as each new home site must be accompanied by large amounts of land. Large lot zoning may also require the construction of extensive new road networks to serve new developments, resulting in additional clearing and fragmentation of forests.

Fortunately, there are alternatives to large lot zoning which can maintain low overall densities while reducing forest fragmentation. One commonly used technique is the **"Planned Unit Development" or PUD**. PUD's allow a landowner or developer to "cluster" development in one area of a parcel while leaving the remainder of the parcel undeveloped. The undeveloped land is often subject to development restrictions, such as an easement, and may be owned by a homeowners association, an individual, a land trust, or a municipality.

One potential drawback of PUD's is that they are often most applicable when a sizeable number of lots are developed at the same time and often require some degree of master planning on the part of the applicant. Much of the development in rural towns in Vermont occurs in an incremental process in which a landowner may only subdivide a single parcel at a time. In some cases, the benefits of PUD's may be achieved with a more simplified subdivision process. One option is to allow **"density averaging"** over an entire parcel.

Also called **"fixed area zoning,"** density averaging allows a landowner to create new building lots smaller than the district minimum lot size, provided that the total number of new lots does not exceed the number that would usually be allowed within the zoning district. The example below provides an illustration of "density averaging."

A parcel contains 100 acres. The parcel is located in a zoning district with a 10 acre minimum lot size. The owner could create a total of ten lots. Applying fixed area zoning, the owner can create nine one acre building lots over a period of several years, while maintaining ownership of the remaining 91 acres. The remaining 91 acres can continue to be managed as a private forest, or sold to another party, but may not be subdivided into additional building lots.

Allow Transfers of Density

Another regulatory tool authorized by statute is a zoning tool called **"Transfer of Development Rights" (TDR)**. Under a TDR, a municipality could identify a critical forest area as a "sending zone." The allowable density for a parcel in that zone can be "sent" to a different parcel located in a "receiving" zone where the Town desires more dense development.

Again using the hypothetical 100 acre parcel, in a zoning district with a ten acre minimum lot size, the rights to develop ten units of housing on that parcel could be transferred to a parcel in a different area; perhaps in a village center where the availability of infrastructure allows for greater density. A ten acre receiving parcel in a district allowing two units per acre (20 units total) could be developed with 30 units if the development rights were transferred.

TDR's have had limited success in rural communities, largely due to the lack of large enough receiving zones with the infrastructure needed to accommodate higher density development. This would likely be a challenge in Vermont's more rural communities. However, communities with sewer and water infrastructure in their downtowns and Village Centers may find TDR's to be a useful tool for conserving forest land while allowing property owners to realize an economic benefit from the development value of their land.

Recognizing the limited applicability of TDR's, some communities have developed a **Hybrid TDR/PUD approach**. In this hybrid scheme, the development rights from one parcel can be transferred to another parcel, also in a low-density rural location. The result is one parcel with a "cluster" of development and another, non-contiguous parcel that remains undeveloped, basically containing the open space portion of the two-parcel PUD. This tool allows rural communities to focus development in areas where it is

most suited (for example, where soils can support greater onsite septic capacity) while preserving undeveloped tracts of forest land.

Both traditional TDR's and Hybrid TDR/PUD's require the administrative capacity to document and track transfers of development rights. In order to ensure documentation, it may be wise to record such transfers as notes on the actual mylars recorded in the Town Land Records.

Subdivision and Development Standards

Currently, many communities that consider forest resources in their local bylaws use fairly vague terms and often call for "minimizing fragmentation" or placing development on areas with least impact. These are vague terms which provide little guidance for both applicants and reviewers. The Vermont Supreme Court, in the recent case *In re Appeal of JAM Golf, LLC*, struck down a South Burlington zoning ordinance designed to "protect important natural resources including streams, wetlands, scenic views, wildlife habitats and special features such as mature maple groves or unique geologic features." The Supreme Court found the regulation did not provide sufficient standards to be enforceable.⁷⁵ Municipalities should be sure to write specific standards that define what important or significant features are and how they should be protected. Communities could consider requiring developers to submit stand-level mapping by a professional forester (or use existing stand-level data from UVA plans) or obtain and submit an evaluation by a certified wildlife biologist/ecologist. Development would then be required to be clustered in stands or areas that have low forestry potential and limited wildlife habitat values. While this would still allow development in forest areas, it would leave the most productive stands intact.

Forestry and Upland Districts

As noted earlier in this Plan, Vermont's ridgelines and hillsides contain much of the State's forest resources. Some communities (for example, all towns in the Bennington Region) have developed Forestry and Upland Districts which limit residential development at higher elevations. These districts may require additional review and standards for residential development (such as conditional use review), contain large minimum lot sizes (25 acres or more), or prohibit residential development altogether. Such provisions may help to provide a resource base for forestry by preventing development of large forest blocks in the State's uplands. Currently, regulations in the Towns of Elmore and Stowe in Lamoille County contain uplands provisions. Through the "Forest Reserve District," Elmore limits development above 1,300 feet in elevation and prohibits new residential and commercial development above elevations of 1,500 feet. Stowe's Zoning Regulations contain a "Scenic Hillside and Ridgeline Overlay District" which contains detailed standards to prevent forest fragmentation, erosion, and impacts on scenic resources.

Shoreline and Stream Buffer Protections

Vermont contains numerous lakes and ponds that are an important forest resource for wildlife, recreation, and aesthetics. However, these areas are also prime locations for development. Limiting

⁷⁵ Wroth, L. K. (2009). IN RE JAM GOLF: GOOD NEWS, BAD NEWS, OR OLD NEWS? Accessed 2011, from http://www.vermontlaw.edu/Documents/Jam_Case%20Summary.pdf

development close to shorelines and preserving shoreline vegetation is often necessary to preserve these resources. The Vermont League of Cities and Towns has developed a model Shoreline Protection Ordinance designed to maintain forested buffers and reduce erosion along shorelines. Likewise, forested stream buffers provide important benefits such as flood control, wildlife habitat, and improved water quality. Many towns have adopted overlay districts or setbacks from stream banks to prevent development encroachment. These so-called “shoreline districts” limit development and land clearing within these areas.

Provisions for Forestry Based Industries

Active forest stewardship is more likely to occur when there is a market for forest products. A working forestry economy requires support industries such as equipment and vehicle servicers and providers, sawmills and other processing facilities such as woodchoppers, pellet manufactures, and other value added manufacturing facilities. Larger facilities may be appropriately located in **industrial parks and commercial districts**.

However, as noted elsewhere in this Plan, there are a growing number of small scale forest related operations in Vermont, including portable and backyard sawmills, small fire wood providers, cottage furniture makers, and other craft industries. In many cases, these small industries are likely run out of someone’s home and are too small to afford space in a commercial park. In addition to providing sufficient space for large industries, it is important that communities ensure that their provisions for **home businesses** allow these types of activities and that onsite processing of materials is included in the definition of forestry found in **local regulations**.

Road Policies

Some communities have overweight road restrictions that allow some commercial truck traffic but restrict access by logging trucks. This prevents access and timber management during the spring months. Logging trucks should be given parity with other commercial trucks by local road policies.

UVA and other tax incentive programs

A large proportion of Vermont is forested and most of these woodlands are privately owned by over 80,000 individual landowners. Thus the individual land owners play a vital role in keeping Vermont forests healthy and a high quality habitat for Vermont wildlife for the present and into the future. Private landowners are finding ways to manage their land and keep their resources and services intact. The Use Value Appraisal (Current Use) program, sale of easements, creation of cooperatives, and sustainability certifications are all strategies that can help. Municipalities can also work, through their planning and zoning processes, to balance growth in some areas with conservation and management of larger tracts of the working landscape in other locations.

The Use Value Appraisal (UVA) Program, also called “Current Use”, enables landowners who practice long-term forest management to have their enrolled land appraised for property taxes based on its value for forestry, rather than its fair market (development) value. It is crucially important, as without the program the annual property taxes on forest land would exceed the annualized income from forest

management. When land is enrolled in the UVA program, the State attaches a permanent lien to the deed. Productive forest land appraised under this program receives this assessment until it is no longer actively managed, developed, or withdrawn from the program by the landowner. UVA enrolled parcels, managed according to approved management standards, are appraised at their use value. Towns are reimbursed for local shortfalls in tax revenues by the State.

The primary goals of the Use Value Appraisal program are to maintain the State's productive agricultural and forest land; to encourage and assist in conservation and preservation, to prevent accelerated conversion of these lands to more intensive use, and to achieve more equitable taxation for undeveloped lands.⁷⁶

Despite the benefits of the current use program, it is perceived by some as a "rich man's" program due to the fact that an individual must own 25 acres or more to enroll. In order to maintain public support for UVA, it will be necessary to educate the public about the public benefits associated with maintaining working forest land, including protection of water quality, maintenance of wildlife habitat, flood and erosion control, and air quality.

The current use program can also be used as a nexus of information for landowners, foresters, and loggers on responsible forestry. Additional efforts could be made to educate landowners with property enrolled in UVA about responsible forest management, their rights and responsibilities as landowners as it relates to logging jobs, State water quality laws, how to ensure they receive a fair price for timber harvested from their land, and how to find and select a reputable logger, such as hiring loggers who have completed the Logger Education to Advance Professionalism (LEAP) program.

One challenge of the UVA program is that, while the program requires forest management plans, individual landowners have diverse objectives, such as timber harvesting, syrup production, wildlife habitat, etc. As the size of forested parcels decreases and the number of individual landowners increases, forests may be managed in an increasingly patchwork fashion. The UVA program could be modified to provide incentives for management plans that meet certain statewide or regional objectives. For example, owners of forest land in a critical wildlife corridor or over the recharge area of a public water supply could be given a further reduced tax benefit if their plans are designed to enhance those functions. Further, landowners could be encouraged through incentives to begin cooperatively managing forestland that is owned by multiple property owners. (See below)

Digital mapping of stand level data using a standardized format may help to provide a better picture of the overall structure of the forest, how it is being managed, and any threats or challenges it may face. Each of Vermont's eleven Regional Planning Commissions has dedicated GIS Planners and could partner with State Foresters to begin this process. At minimum, spatial data on parcels enrolled in the current use program should be updated to reflect boundary changes, and the attribute data should include the

⁷⁶State of Vermont, 2010. The Vermont Statutes Online. Title 32: Taxation and Finance. Chapter 124: AGRICULTURAL AND FOREST LANDS Statement of purpose 32 V.S.A 3751. Accessed 2012 at <http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=32&Chapter=124&Section=03751>

consulting forester who developed the management plan and the overall management objectives of that plan.

Cooperative Management and Marketing

The expense of actively managing a sizeable woodlot can be considerable for a private landowner. Logging companies can find it challenging to maintain a positive cash flow and generate a profit because of large up-front investments in equipment and high operating costs. Cooperation among landowners and forest products businesses to reduce costs and gain efficiencies should be investigated and encouraged. Landowner cooperatives can help reduce each individual's land management costs and to facilitate joint marketing of forest products. Landowners who coordinate activities through a cooperative or association can share in road and other infrastructure costs, develop comprehensive management plans, and jointly apply for State or Federal assistance. Cooperative management can also be instrumental in landowners securing better per acre pricing from loggers, obtaining favorable long-term contracts, and identifying markets for their products.

By banding together a group of forest landowners can more effectively “brand” their products and reap the respect and financial benefits of market visibility “branding” can generate. A cooperative, for example, could jointly seek third-party certification that its lands are being managed in a sustainable fashion. Certification, through an independent audit, by a group such as the Forest Stewardship Council, Vermont Family Forests, or the Sustainable Forestry Initiative has a very real potential for increasing the ability to access markets and command premium prices. The overall forest ecosystem health and protection of the working landscape can also benefit from landowner cooperatives. Coordinating activities over multiple properties can make the properties more attractive to organizations seeking to purchase conservation easements.

This cooperative model could help—address several of the challenges noted earlier in this report. Landowner cooperatives would provide a mechanism for managing forests on the larger scale necessary for effective timber management, while allowing individuals to maintain ownership of lands that have been previously parcelized. Landowner cooperatives could also address the vulnerability faced by second home owners. While individual landowners may not be able to monitor operations on their property, either due to a lack of technical forestry skills or periodic or seasonal absence from the state, representatives of the cooperative could ensure that appropriate forest management practices are followed during timber harvesting. Representatives of the cooperative could also ensure that landowners are given fair prices for timber on their land and monitor against timber theft and other predatory practices.

Strong Forest Resources Based Businesses - Economic Opportunities

Develop New Markets for Forest Products

Over the last decade Vermont has lost many of its sawmills, from 169 in 2000 to 105 in 2010. Much of the millable timber harvested in Vermont is exported to Canada for processing. This trend is likely to

continue absent changes in economic conditions and international trade policies beyond the control of the State of Vermont. A result of this shift is that larger amounts of timber need to be harvested to be profitably shipped to Canada. This creates a barrier for smaller landowners who have less timber to ship. **Concentration Yards** such as Buffalo Mountain Wood and Transfer Hardwick, which allow landowners to sell smaller amounts of timber that are then resold to shippers, are one way to address this issue.

If sawmilling is to be economically viable in Vermont, it will likely require the development of **greater demand for locally milled lumber**. When compared to the local foods movement, there is an unmistakable absence of a strong consumer movement for local wood and wood products. Vermont grown and milled timber should become as renowned as Vermont cheese and maple products. Even if successful, producers are likely to be selling to niche markets and be of a small scale. Mirroring trends in “local agriculture,” some products may be created by “backyard” mills and workshops and sold directly to customers rather than by the large wholesale mills that have typified the lumber industry in the past. Building such a movement will likely require a coordinated effort by private organizations and regional and State economic development officials. Vermont forest products should be aggressively marketed in local, regional, and national markets. There are many resources currently available to small business start-ups in Vermont, such as those offered through the **Vermont Small Business Assistance Center**. Working in partnership with forest and wood product organizations, additional effort should be made to inform County residents interested in developing or expanding forest products based businesses about existing business assistance programs. If there is sufficient demand, workshops and business development programs specifically tailored to the forest products industry should be developed.

“Certified Timber”

One way to differentiate products grown by landowners committed to good forest management is through third-party verification stands. Under certification standards, independent bodies review forest management practices and give their “stamp of approval” that prescribed stewardship and management standards are met. Certification programs available to Vermont forest owners include the Forest Stewardship Council (FSC), Vermont Family Forests (VFF), and the Vermont Tree Farm System which is the State affiliate of the American Tree Farm System (ATFS.) VFF also offers tailored certification for firewood under its “NeighborWood” Certification. In general, the FSC is more applicable to large forest lands, while the ATFS and VFF are tailored toward smaller landowners. The standards required for third-party verification can help to ensure better stewardship of forest resources.

While consumers have come to recognize the term “organic” as it applies to food products and while products meeting organic standards can command a premium, certified timber is less well known. If certified timber is to provide an economic benefit to Vermont’s wood products industry, more effort will be needed to promote the concept to consumers.

Biomass, Firewood, and Wood Pellets

Due to past practices of high grading, much of Vermont’s existing forests contain relatively low quality timber that is not marketable for lumber. In the past, this lower quality wood could be used as

pulpwood for paper. However, that market has also declined. Biomass, either for electricity or institutional/district heating, represents a potential new use for lower quality wood, including wood from trees that cannot be economically harvested for firewood. Over the long term, responsible cutting of this lower quality wood will improve the overall health of the forest and allow higher quality trees to grow.

On a smaller scale, many homes can be heated with a single wood or pellet burning stove. Cordwood requires little preparation other than splitting and drying, and is readily available from Vermont suppliers. Given the potential for cordwood to spread invasive species, it is important to overall forest health that cordwood not be transported long distances. This challenge highlights that “buy local” has benefits for firewood as well as food. Better **marketing of locally cut cordwood** could increase opportunities for local Vermont businesses while also preventing the spread of unwanted pests.

Wood pellets require more energy to produce but burn more efficiently and are easier to store and feed into a stove or furnace. There is currently only one pellet manufacturer in Vermont, Vermont Wood Pellet Company in North Clarendon, Rutland County. In 2009, the company was recognized by the Rutland Economic Development Corporation for job creation and its green initiatives. The company states that all logs are harvested from local Vermont woodlots, are processed locally and the pellets are distributed for sale locally.⁷⁷ Excess heat from biomass electric generators can be used in the pellet manufacturing process, increasing the overall efficiency of both processes. Pellet facilities in other parts of the state could create new markets for lower quality timber.

Education and Outreach

Education and outreach is vital to promoting good forest management practices. One outreach component could be regional or state-wide **Forest Stewardship Brochures**. Large scale distribution of these brochures could be assured by partnering with Towns and Utilities to enclose the brochure with tax and utility bills. The brochure would include practical advice for landowners regarding responsible forest management, their rights and responsibilities as landowners as it relates to forest management, the benefits of working with a forester and LEAP certified loggers, and the importance of obtaining bids/estimates from loggers. A sample statewide brochure has been developed by the Vermont Woodlands Association that could be modified to reflect regionally specific issues.

Through the UVM Extension Service, or other organization, in-depth **workshops on forest management** and small woodlot ownership, similar to UVM’s Master Gardner Program should be developed. The **Hogback Community College** in Addison County, which organizes workshops on a variety of forestry related topics is an example of a community based forestry education program that could be developed in other regions. **Stewardship of the Urban Landscape (SOUL)** courses on urban forestry techniques offered by the Vermont Department of Forests, Parks, and Recreation should be promoted. Graduates

⁷⁷ Rutland Economic Development Corporation Highlights Award Winners at 72nd Annual Meeting. Rutland Economic Development Corporation website. Accessed 2012 from <http://www.rutlandeconomy.com/72ndannualmeeting.php>.

of the program could be recruited and encouraged to provide leadership in urban forestry initiatives with the local communities. Shorter topic specific workshops and event, possibly hosted at Town forests, could be offered on a regular or rotating basis.

Promote Forest Stewardship at Town Forests. Town forests could once again be used to promote sound forest stewardship practices. Workshops in Town forests could be used to promote the work of organizations like **Vermont Coverts** and the **Vermont Woodlands Association**. Town forests could also be the site of programs such as **the Wildlife Habitat Incentives Program (WHIP)**. Demonstration forestry projects could be developed and implemented on Town forests, and remote webcams could be installed to track wildlife and other changes within the Town forest. Working with local volunteers or programs such as UVM LANDS, **natural resource inventories** of Town forests could be developed and shared with area landowners as an example of the types of resources that could be found on their property.

Town forests can provide an opportunity for positive discussions with property owners about both sound and poor forestry practices without commenting on the condition of any individual's property or quality of stewardship. Property owners invited to workshops in Town forests can be educated about sound forest stewardship practices and the various programs and organizations available to assist them in implementing these practices, while maintaining the autonomy of their own property.

In order to coordinate these efforts, regional **Consortiums of Town Forests and Conservation Commissions** should be formed. These consortiums would allow members of local conservation commissions and individuals interested in Town forests to network, share ideas, and organize and promote events. A consortium could hold regular meetings and/or develop and provide an informational list serve.

Regional Priority Issues and Strategies to Keep Forests as Forests

Up to this point, this report has focused on a summary of the findings of each region with regard to forest resource values, barriers to keeping forested areas as forests, and tools/strategies to promote sound forest stewardship. To a large degree the valued attributes of forests are universal across different regions: forests provide numerous ecological, recreational, scenic, economic, and cultural resources described earlier in detail. In a similar way, sound forest stewardship is encumbered by universal environmental threats such as acid deposition, climate change, the spread of invasive species and forest pests/diseases, and catastrophic natural disturbances. Incompatible development and parcelization was identified by all regions as a major barrier to retaining our forestlands. Likewise, a "toolbox" of general strategies was developed that any region can use to promote sound forest stewardship.

This section shifts the direction of the discussion from the identification of universal values of forests, threats to forest stewardship, and strategies, to the recognition of differences among the regions with regard to the priority issues each region chose to focus on. The different priorities of each region

evolved in response to regional differences in landscapes, political and cultural climate, economies and demographics, environmental pressures/assets, and regional conservation framework.

Addison

The “forest story” needs to be told

The Addison Regional Forest Stewardship Committee discussed the dynamics of the working landscape. There was recognition that even though the landscape is not static but constantly evolving, people do not see forest growth and therefore presume that forests are “frozen” in time. Agricultural crops rotate on an annual basis and this cycle is easily accepted; whereas timber harvesting occurs over a longer time frame and the cycle of growth and harvest is not readily acceptable to many people. The committee felt that the forest landscape is not well understood and that the dynamic history of the landscape has not been well conveyed to the lay public. They felt that the “forest story” needs to be told, especially in town plans, to educate the public and municipal officials about the benefits and the needs of forest management.

Indicators to monitor the dynamics of the forest landscape

Expanding on the discussion of the dynamic forest landscape, the committee brought up the need for indicators to measure those dynamics, with the intent to track and document the dynamic but slow changes to the forested landscape. A Middlebury College intern was subsequently hired to test some of the indicator concepts proposed.

John Filoon, Middlebury College Intern, Bill Hegman, Middlebury College GIS Specialist and Regional Planning staff developed a potential indicator to track the status of forest land in each municipality. The Stewardship Committee felt that community forest policies will only be strengthened if it is clearly recognized that there is loss of forest land. Land cover data is collected for the entire United States approximately every 5 years as the National Land Cover Database (United States Geological Survey, 2006). The most recent dates are 1992 and 2006 – a 14 year span. Land cover data from 2001 was also analyzed. The forest cover extent from the two dates was compared for each town. In addition, core forest blocks of at least 250 acres were determined at each date and the resulting gain or loss of forest core was determined. E911 house locations have been collected in all Addison County towns since 1999 and this earliest data was used with the 1992 land cover data and 2007 (January) data was used for the 2006 land cover data. The resulting data was tabulated for each town in the county. Core forest acreage in 1992, 2001 and 2006 and percent change from 1992 – 2006. Forest patches over 20 acres is also tabulated for each date by town. The results show that over the 14 year study period municipal forest in over 20 acres patches averaged a 6% decrease. The municipal core forest decreased an average of 10% over the same time frame⁷⁸ (Filoon, 2011).

Policies to support a well-functioning commercial forest infrastructure

Vermont has high-quality forestland, but the right policies and strategies need to be in place to maintain a commercial forest infrastructure. Just as with agriculture, you need the mills, brokers, loggers,

⁷⁸ Filoon, J. 2011. *Analyzing Forest Change in Addison County*. unpublished.

equipment wholesalers and value-added products to make the whole system function. The committee expressed some apprehension that the Forest Stewardship project might result in more regulation on forest management that would be counter-productive; there was also a recognition that general ignorance about forest management was already making forestry more difficult, and that “telling the forest story” mentioned previously might lead to better policies conducive to good forest management.

Bennington

Mapping raw data versus a modeling approach

Early on in the development of the forest stewardship plans, there was a discussion amongst the regional and state partners regarding the type of GIS data that would be most useful to present to regional forest stewardship committees, in order to help the committees to identify priority landscapes. Two general approaches were discussed: using a modeling approach to aggregate many GIS layers into a single layer ranking forest stewardship potential, or simply presenting the raw data as a series of maps depicting categories of forest attributes. The Bennington regional committee stated a clear preference for the raw data approach, arguing that using the modeling approach could result in some important inputs being cancelled out by others, so that the resulting ranking ignores significant features. Furthermore, the resulting maps would not describe why an area received a particular ranking.

Focus on non-regulatory strategies

Municipalities in the Bennington Region all have restrictive forest land use districts in “upland forest” areas in their plans and zoning bylaws, whereas some of the other regions’ towns rely less on regulations. Consequently, the BCRC plan’s treatment of regulation is more directed at finding ways to encourage conservation of key forest lands in town/village and rural valley landscape areas, where existing regulations are not as focused on resource conservation.

Less concern about forest fragmentation than other regions

There is a greater concern over residential sprawl and forest land fragmentation in the other three plans, perhaps owing to the closer proximity of more developed/suburbanizing areas. The Bennington Region has seen little (virtually no) permanent development in its upland forest areas in recent years.

Using forest resources to support sustainability

The Bennington Region has a large share of publicly owned land (especially Green Mountain National Forest) and that fact influences the discussion in a number of ways, perhaps most notably influencing the perception that there are abundant forest resources in the region at this time and efforts should be focused primarily on: identifying and conserving critical forest resources in areas where private ownership prevails, and in promoting economic activities that utilize forest resources on both public and private land to support a working landscape and sustainable communities. To that end, the Bennington Regional Forest Stewardship Committee chose to focus to a large extent on wood biomass energy. The Bennington plan also notes that some net conversion of forest land to nonforest uses (agricultural) may be appropriate or necessary in the future to meet sustainability objectives, an idea that was unique to that region due to the large percentage of intact forested land.

Lamoille

Wildlife habitat and corridors

As noted in earlier sections, much of Lamoille County consists of unfragmented core wildlife habitat. In addition to core habitat, wildlife relies on corridors to travel between one area and another. Human development, notably highway infrastructure, can disrupt this movement. Identification of wildlife corridors is the first step to protecting them. There were several discussions related to forests' function as wildlife habitat, and the importance of maintaining vital connections between large blocks of forest. The Staying Connected Initiative (SCI) was introduced to the Committee. SCI is a collaborative effort between 20 organizations dedicated to fish and wildlife conservation through the preservation of large forest blocks and the lands connecting them. The SCI has identified the Northern Green Mountains and Worcester Range as an important regionally significant area for wildlife connectivity, and has also identified a threatened critical pathway called the "Willow Crossing" between Cambridge and Johnson.

It was noted that forest management practices are sometimes compatible but other times in conflict with wildlife. Methods of outreach were discussed such as outreach to landowners on state programs/incentives to manage land for wildlife, or having Vermont Department of Fish and Wildlife conduct a "Community Values" mapping session. Some communities, such as Craftsbury, Charlotte, Richmond, Underhill, and Jericho, have actively organized citizen volunteers to track and identify important wildlife road crossings. Rutland County has developed a wildlife sightings map that allows both trained and untrained volunteers to report wildlife sightings. These methods could be used in Lamoille County to begin the process of identifying wildlife corridors.

Once identified, wildlife corridors can be enhanced in several ways. Overland corridors can be conserved through purchase of land or easements or by providing property owners with tax incentives to maintain the land as undeveloped (see UVA discussion above). In some cases, enlarging bridges or culverts may provide sufficient passage for wildlife through the highway system.

Use-value program, present and future

Members of the Steering Committee and local Conservation Commissions emphasized that the Use Value Appraisal Program (UVA, also called current use) is the most important program for conservation of active forest land within Lamoille County. UVA allows landowners to pay the "use value" rather than the development value. Approximately 48% of all land in Lamoille County is enrolled in the current use program. Landowners with forest land enrolled in the UVA program are required to develop and implement forest management plans developed by a certified forester. Short the UVA program, it is likely that some forest land in Lamoille County would be subdivided and developed. Additional land, particularly large parcels owned by individuals without a direct interest in forestry, would likely cease to be actively managed.

However, concerns were raised that the use-value program is unsustainable, due to the financial burden on the state and on the landowner to pay for responsible management of forest land. It was noted that some people are reluctant to enroll in the program because they did not want to be limited by State control. Although the program is preventing a good deal of landscape fragmentation, there was a

recognition that better stewardship would result from abutting landowners collaboratively developing a single forestry management plan, and that incentives to do so would be beneficial. There is also the need to address the issue of stability in forest management. At minimum, forest management plans should target periods of forty years, and 80-100 years would be even better. The current use-value program requires a five year management plan.

Forests as working landscapes

The Interstate 91 corridor represents a major transportation route of raw timber to Canada and finished products to the United States. Much of the millable timber harvesting in Lamoille County is now exported along this corridor to Canada for processing. This trend is likely to continue absent changes in economic conditions and international trade policies beyond the control of Lamoille County or even the State of Vermont. A result of this shift is that larger amounts of timber need to be harvested to be profitably shipped to Canada. This creates a barrier for smaller landowners who have less timber to manage and market.

Even as raw timber is exported to Canada, many finished wood products are imported into the County and State. This even includes wood chips for biomass heating which can be made from lower quality wood that is prevalent in Lamoille County's forests. Currently, only three sawmills are active in Lamoille County. The County has numerous gaps in processing, product aggregation, distribution, and market development for its own forestry products. Absent concerted efforts, these gaps will continue to grow as competition from foreign milled lumber and other forest products continues to put pressure on the industry.

The importance of agriforestry was noted by the Committee. Agriforestry includes non-timber forest products such as maple syrup, Christmas trees and foraged edibles like fiddleheads, ramps, and mushrooms. It was noted that agriforestry is an important economic engine for the region, and that there is a growing need for collaboration between the forest and farm industries, especially in light of the recent agricultural renaissance.

Forests as recreational areas

Recreation was a primary value stated by the Steering Committee, and some priority landscapes identified were popular recreation areas like Green River Reservoir, Zack Woods, Mount Mansfield and Smugglers' Notch. A nonspecific priority area identified was "larger, private tracts of forested land" and particularly those large tracts with public access. Public access was cited as an attribute of good stewardship. Concerns were raised about the growing trend of landowners posting their land. It was noted that many landowners have chosen to post their land as a response to a lack of respect shown by some recreational users. A mapping exercise was suggested to track parcels that are posted.

Two-Rivers Ottauquechee

The Two Rivers-Ottauquechee region's approach was unique in highlighting the interconnection between the cultural and social, economic and environmental context of forest issues. What follows is the TRO Forest Stewardship Steering Committee's synopsis of some of the key issues defined and a

statement of goals and strategies to address those issues. A detailed description of Issues, Goals, Strategies and Actions can be found in the Two Rivers-Ottawaquechee Forest Stewardship Report.

ISSUE: DIMINISHING CULTURAL CONNECTION TO FORESTS

The lack of personal and cultural connection to forests and forest services/products is concerning.

- Environmental Repercussions: This lack of connection is indicative of, and reinforces, the knowledge gap between consumers and producers of forest products. Without informed and proactive consumers, it is less likely that industry will be held accountable for their impact on forests. Simply, if TRO residents do not value the environmental benefits of our forests and act as stewards of this resource, degradation is inevitable.
- Economic Repercussions: A lack of personal or cultural connection to forests will drive consumers towards the lowest priced wood products, which will undercut local businesses in favor of foreign competition.
- Social Repercussions: TRO residents will begin to lose sight (literally) of their heritage, ‘the Green Mountains.’

GOAL: FOSTER A CULTURE IN WHICH FORESTS AND THEIR PRODUCTS/SERVICES ARE RESPECTED.

STRATEGIES:

- Promote inspiring forest-related experiences for community members, especially kids and young adults.
- Promote educational lectures and events that emphasize forest stewardship.

ISSUE: THE ECONOMIC INCENTIVE TO DEVELOP

A private landowner can usually procure a higher return on investment by developing a forested parcel, instead of managing it for the forest’s continued existence.

- Environmental Repercussions: This value system results in more forest lands being cut or paved for development with negative impacts on wildlife habitat and travel corridors, as well as water quality, not to mention the loss of scenic and recreational opportunities.
- Economic Repercussions: The economic incentive to develop forest lands results in unbalanced or incomplete accounting of forest benefits to human society. For instance, forests can mitigate the impacts of flooding, thereby saving governments and landowners huge amounts of money by avoiding damage.
- Social Repercussions: Fewer forest lands adversely affects Vermonter’s heritage and identity as experiences change to reflect living in a ‘developed’ area instead of a wild or more rural one.

GOAL: INCREASE THE NUMBER OF PRIVATE LANDOWNERS IN PRIORITY FOREST AREAS WHO ARE COMMITTED TO FOREST STEWARDSHIP.

STRATEGY: EDUCATE PRIVATE LANDOWNERS IN PRIORITY FOREST AREAS ABOUT FOREST STEWARDSHIP AND THE REGIONAL CONTEXT OF THEIR LAND.

GOAL: ENSURE THAT THE UVA PROGRAM ENHANCES FOREST STEWARDSHIP, WHILE REDUCING INSTANCES OF PARCELIZATION AND FRAGMENTATION.

STRATEGY: RESEARCH AND HIGHLIGHT MODEL FOREST MANAGEMENT PLANS FOR LANDOWNERS CONSIDERING THE UVA PROGRAM.

GOAL: TO HAVE EDUCATED, INFORMED, AND INSPIRED PRIVATE FOREST LANDOWNERS WHO ARE ACTIVE STEWARDS OF THE LAND.

STRATEGY: PROVIDE CRITICAL INFORMATION TO PRIVATE FOREST LANDOWNERS TO HELP THEM MAKE INFORMED LAND MANAGEMENT DECISIONS.

GOAL: EDUCATE CONSULTING FORESTERS ABOUT REGIONAL FOREST STEWARDSHIP PRIORITIES AND LOCAL LAND USE REGULATIONS.

STRATEGY: PROVIDE CRITICAL INFORMATION (SUCH AS GIS DATA) TO CONSULTING FORESTERS WHO DRAFT FOREST MANAGEMENT PLANS UNDER THE UVA PROGRAM.

GOAL: TO HAVE INFORMED LOCAL PLANNING COMMISSIONS WRITING FOREST POLICIES INTO LAND USE REGULATIONS THAT REFLECT LOCAL AND REGIONAL FOREST STEWARDSHIP DATA AND PRIORITIES.

STRATEGY: PROVIDE CRITICAL INFORMATION TO MUNICIPAL OFFICIALS WHO ARE RESPONSIBLE FOR CREATING AND REVISING THE TOWN PLAN AND ANY ZONING ORDINANCES.

ISSUE: ABSENCE OF A POPULAR 'BUY LOCAL' MOVEMENT

The lack of a 'buy local' forest products movement is a major obstacle to forests continued existence in the TRO region. The absence is marked when compared to the local food movement which is thriving in Vermont and across the nation.

- Environmental Repercussions: A 'buy local' movement would create a more direct opportunity for consumers to demand that a business operate with a certain level of environmental integrity. The lack of this movement is troubling.
- Economic Repercussions: The lack of a 'buy local' movement means that consumers will be less likely to pay extra for locally made furniture, toilet paper, and other goods. This harms the local economy and translates into fewer jobs in the TRO region.
- Social Repercussions: The absence of a 'buy local' movement means that individuals will not receive the same level of support from peers when trying to make conscientious shopping decisions.

ISSUE: DECREASE IN LOCAL WOOD PROCESSING SITES

The TRO Forest Stewardship Committee is concerned that the decreasing number of manufacturing or wood processing sites in Vermont will continue the trend of out-of-state shipment of raw materials.

- Environmental Repercussions: With fewer locally based wood processing sites, raw materials will have to travel greater distances before being processed and sold, increasing the industry's 'carbon footprint' and contributing to global climate change.
- Economic Repercussions: Shipping raw materials out-of-state results in the loss of secondary manufacturing jobs and the eventual deskilling of the TRO labor force in this industry. Consider these statistics from 2005:
- Social Repercussions: The decreasing number of nearby wood processing sites discourages locally based partnerships in the forest products industry. This not only constitutes a lost economic opportunity, but a lost social one as well.

GOAL: TO HAVE A STRONG LOCAL FOREST PRODUCTS MOVEMENT AND ENSURE THAT THERE IS ENOUGH AND THE RIGHT TYPE OF INFRASTRUCTURE TO SUPPORT PRODUCTION.

STRATEGIES:

- Educate and inspire consumers to shop locally for forest products.
- Learn about ways to incentivize local milling of timber and advocate for support from key institutions (State of Vermont, Vermont Wood Manufacturer's Association (VWMA), and others).
- Determine the infrastructure gaps that encourage or even force industry to process wood outside of Vermont. (For example, this region does not have a pulp mill for waste products.)
Potential Partners: Chambers of Commerce, forestry organizations, Vermont Wood Manufacturer's Association (VWMA).
- Begin a 'buy local' campaign in the TRO region that promotes a range of wood related products ideal for daily use or as special gifts. For example, promote products through advertising in local newspapers, especially around holidays, and highlight the local stores that sell them. *Potential Partners: Chambers of Commerce, forestry organizations, Vermont Wood Manufacturer's Association (VWMA), Vermont Wood Products Marketing Council (VWPMC).*

Evaluation of Landscape Stewardship Approach: Lessons Learned and Future Recommendations

1) Objective: Develop and test a GIS-based methodology for forest planning based on a landscape-scale

➤ Data gaps that cannot be addressed during the project period and may affect the project outcome have been identified.

The primary data gap that was identified during this project was Use Value Appraisal (UVA) parcel data. County Foresters or others have mapped this data in some but not all regions. While Lamoille, Bennington and Addison had UVA parcel data for all towns in their regions, Two Rivers-Ottawaquechee did not. The location of forested lands enrolled in the UVA program, in relationship to forest resources and threats, is vital to understanding and analyzing forest stewardship at a regional level; this information is necessary in order to designate priority landscapes for forest stewardship efforts and to target landowners for appropriate outreach.

The larger issue to address is the need to develop a systematic way of accomplishing the initial creation of digital UVA parcel data as well as regularly updating the data. Given the relatively short time frame of UVA management plans, parcel turnover can be high and the GIS parcel data becomes outdated in a short period of time. For example, Lamoille County Planning Commission digitized the County's UVA parcel data in 2010 and it already needs updating. At minimum, spatial data on parcels enrolled in the current use program should be updated to reflect boundary changes, and the attribute data should include the consulting forester who developed the management plan and the overall management objectives of that plan. This burden cannot fall on the county foresters who are already stretched thin by the responsibilities of administering the UVA program; and there is currently no funding source for the Regional Planning Commissions to undertake the task of maintaining the data.

An extension of this is the need for digital mapping of **stand level data** using a standardized format to provide a better picture of the overall structure of the forest, how it is being managed, and any threats or challenges it may face. The challenge of accomplishing these tasks will only be met with additional funding to develop and implement a self-sustaining and user-friendly system of data collection/entry and through cooperation between multiple partners.

An additional data gap identified was the lack of forest data collected at the local level. GIS data, often developed at a coarse scale and intended for statewide or regional analysis, is difficult to extend to the local level. Land cover data in particular should be reviewed at the town level.

Forest harvest data currently is aggregated by county; it would be much more useful for planning purposes to have municipal level data.

➤ **Maps of forest resources adequately characterize forests at a landscape scale.**

Early on in the development of the forest stewardship plans, there was a discussion amongst the regional and state partners regarding the type of GIS data that would be most useful to present to regional forest stewardship committees, in order to help the committees to identify priority landscapes. Two general approaches were discussed: using a modeling approach to aggregate many GIS layers into a single layer ranking forest stewardship potential, or simply presenting the raw data as a series of maps depicting categories of forest attributes. The advantages of modeling forest stewardship are that 1) an “accurate” model simplifies the selection of priority areas because the resulting map clearly shows areas that stand out as ranking “high” in forest stewardship potential, as opposed to other areas that might rank “low”; and 2) since the State had already developed a model for forest stewardship potential, we could have potentially used that as a template for modeling at the regional level. The disadvantages of this approach are that 1) the process of aggregating inputs could result in some important inputs being cancelled out by others, so that the resulting ranking ignores significant features; and 2) the resulting map would not describe why an area received a particular ranking and thus would leave out crucial information.

In the end we decided to create a series of maps, described in the methods section, depicting the following forest attributes:

- 1) Biophysical Regions and Land Cover
- 2) Land Use Regions
- 3) Forest Productivity and Timber Resources
- 4) Habitat Blocks
- 5) Ecological Resources
- 6) Recreational and Scenic Resources
- 7) Water Resources
- 8) Conserved Lands and Use-Value Appraisal Parcels
- 9) Resource Constraints: Human and Environmental
- 10) Forest Stewardship Potential

We believed that the Steering Committees and the general public would have a much better capacity to relate to maps showing locations of forest resources and constraints versus a single map that depicts an abstract concept of “stewardship potential” shown as different shades of green. Note that we also included the Forest Stewardship Potential map produced by the State’s Spatial Analysis Project (SAP) for comparison purposes, so that stakeholders could view that map in relationship to the other maps.

If conducted wisely, modeling has an important role to play in resource conservation; however, because this project focused to a large degree on public engagement, it was critical to use readily accessible and understandable tools to characterize forests. The maps served as valuable media used by the Steering Committees to understand the full spectrum of resources that forests provide and where those resources are located; and conversely, to understand where and why forests are threatened. Putting all that information together allows the visualization of priority landscapes.

➤ **Forest landscape types are identified and can be used as a basis for subsequent planning.**

This objective was not well defined and consequentially proved to be challenging. Addison included a “Generalized Land Use Regions” map in their forest stewardship plan. This map is used in the Future Land Use section of the Addison County Regional Plan, and is a composite of land use maps from town plans. It attempts to depict the Land Use regions adopted by each municipality in four broad categories: Village/Commercial/Industrial, High Density Residential, Rural/Agricultural and Forest/Conservation/Floodplain.

Using their regional land use plan, Bennington divided their region into Upland Forest, Rural Valley, and Town and Village landscape types, comparable to the Rural, Rural Residential and Urban landscape types described in the 2010 State Forest Resource Plan. Primarily for convenience, Lamoille used the Landscape Classification data layer from the State Plan, with the Rural, Rural Residential and Urban classifications even though this layer did not adequately characterize the Lamoille County landscape. For example, the term “urban” seemed awkward when referring to Morristown or Johnson. In retrospect, it would have been more informative and applicable to use a landscape classification similar to Addison and Bennington’s, or to create a data layer using appropriate housing density classifications. In the future, the methodology for this task should be clearly defined.

➤ **Forest resource plans can be incorporated into comprehensive regional plans.**

Most of the Regional Plans in Vermont discuss forests and forestry related issues within a Natural Resources section. Each of the four regions examined their current respective regional plans to analyze the degree to which those plans addressed forest related issues and the protection of forest resources, and how those plans might be strengthened. One of the primary objectives of this project was to use the information gleaned from the research and the Steering Committee meetings to better inform and thereby strengthen the treatment of forests in Regional Plans. Elements of the forest plans can and will be incorporated into the comprehensive regional plans, albeit in a condensed format.

2) Objective: Engage local and regional stakeholders in the process to insure local issues are addressed

➤ Key stakeholders are identified

Four regional stakeholder groups were established to guide local efforts. Stakeholder participants included county foresters, state lands specialists, private forest landowners, consulting foresters, local officials, representatives of forest product industries, environmental/conservation groups, and the Green Mountain National Forest. The proportional representation of stakeholder groups varied among the four regions (Figure 18); for example, the Steering Committees of Bennington and Two Rivers had substantially more representation by foresters than did Lamoille and Addison, and Lamoille and Two Rivers had greater presence of Natural Resource/Conservation professionals than did Bennington and Addison. Overall, adequate representation of key stakeholders was achieved; however, there was a noticeable absence of forest industry and forest landowners on the Two Rivers Steering Committee.

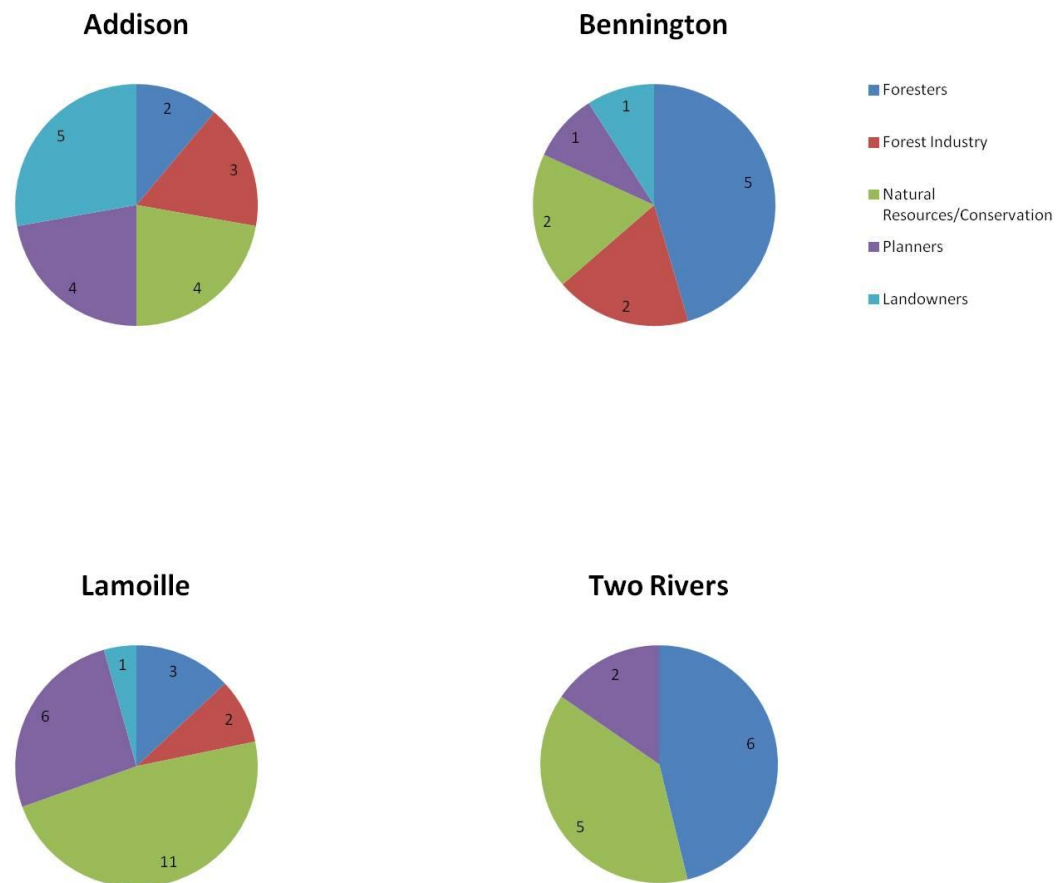


Figure 18: Representation of stakeholder groups by region. Individuals that identified as more than one stakeholder, for example, forester and forest landowner, were counted more than once.

➤ **Input is received from key stakeholders**

Each region convened a series of public/stakeholder work sessions to review and discuss the forest landscape maps and data and to identify issues relevant to each. The actual number of meetings convened, as well as topics discussed, varied by region. The Lamoille Steering Committee's first few meetings dealt with very broad topics such as "a discussion of the working landscape in Lamoille County" and "an identification of local concerns." Consequentially, the discussions that ensued tended to be less focused and less productive than in later meetings when the topics were more specific and clearly defined. The direction of meeting discussions and the overall direction of each steering committee was largely determined by the stakeholders present. The Bennington Committee, made up of individuals who had been working together for a long time, was able to focus on key issues and strategies early on. There is every reason to believe that, with sustained commitment to the project, the other committees will be able to implement strategies that achieve their objectives. All in all, the input received from the stakeholders was extremely valuable and there appears to be strong and sustainable interest in this project.

➤ **Outreach opportunities allow for input by the general public**

As a deliverable for this project, each region drafted a public outreach plan. The plan for outreach included the Steering Committee meetings themselves; encouraging Steering Committee members to talk to others in their sector about the project; meeting with town Conservation Commissions; targeted outreach to key stakeholders not on the Steering Committee; consultations with Statewide organizations, Watershed Associations and State entities such as the Agency of Natural Resources; presentations to Regional Directors, and a public meeting/presentation at the end of the project. Future outreach should target communities to garner support for the implementation of specific forest stewardship projects.

➤ **Local and regional issues are identified**

Primarily through the Steering Committee meetings and through stakeholder input, local and regional issues were identified. Undoubtedly, the issues that came to the forefront were largely a function of who was on the Steering Committee. This highlights the need to focus on outreach early on to ensure that the committees represent *all* key stakeholders, so that all important issues are identified. While some issues are universal across regions, the stakeholder involvement highlighted issues unique to each region.

➤ **Stewardship opportunities are identified for forest landowners**

The Strategies section details many stewardship opportunities for landowners such as the UVA program and other tax incentive programs; private landowner associations like Vermont Family Forests, Vermont Woodlands Association and Vermont Coverts; as well as the concept of cooperative management and marketing. Now that these strategies have been researched and compiled, the next step is to inform landowners about them through brochures, mailings, newspaper articles and public presentations.

3) Objective: Identify strategies and develop tools for regions, municipalities, and forest landowners to keep forests as forests

➤ Common statewide issues are identified through the regional input

To a large degree the valued attributes of forests are universal across different regions: forests provide numerous ecological, recreational, scenic, economic, and cultural resources described in this report. In a similar way, sound forest stewardship is encumbered by universal environmental threats such as acid deposition, climate change, the spread of invasive species and forest pests/diseases, and catastrophic natural disturbances. Incompatible development and parcelization was identified by all regions as a major barrier to retaining our forestlands. Likewise, a “toolbox” of general strategies was developed that any region can use to promote sound forest stewardship.

➤ Strategies and tools are identified and address both statewide and regional issues.

An extensive catalog of strategies was researched and developed, divided into four areas:

- Public or private conservation efforts;
- Local or state land use and environmental regulations that limit alternative uses of all or a part of a property;
- Organizations that promote education and advocacy around forests and forest issues (Conservation Commissions, Conservation Organizations); and
- Economic development assistance (Forest Product Associations and Landowner Associations) that supports continued forest resource uses of a property.

Additionally, there is a wealth of information from communities throughout the state who have initiated forest stewardship projects and practices of their own. Promoting 'best practices' from other communities was very well received.

➤ Strategies are realistic – they are achievable; socially, financially, and politically feasible; and will be “owned” by an organization, agency, or individual.

All strategies identified are theoretically achievable, given enough support. Primary strategies and priorities differed by region, with Addison placing an emphasis on tracking and monitoring trends over time, Bennington on achieving regional sustainability, Two Rivers on promoting the cultural values of forests, and Lamoille on economic policies that promote the forest industry. In reality, the list of strategies is too extensive to implement in totality. Each region will need to prioritize certain strategies to implement based on regional and local interest as well as financial and political feasibility.

➤ Modifications to existing tools are described

Included in this report is a section on additional strategies, which details modifications to existing regulatory and non-regulatory tools. Modifications to land use regulations include developing alternatives to large lot zoning such as **Planned Unit Developments (PUDs)** and **Transfer of Development Rights**, and using highly specific language in zoning and subdivision regulations to assure protection of valued natural resources. Economic strategies were presented, including new opportunities to market forest products such as **Certified Timber** and the potential for **biomass** development. Many opportunities for education and outreach were presented as well, including **forest stewardship brochures, workshops, and demonstration projects**. There was recognition that modifications to the UVA program might be necessary to sustain it. In particular, keeping an updated GIS layer of UVA parcels was considered extremely important. The development of public tools to track forest land change and parcelization is very important. Monitoring and documenting forest land cover change was given high priority as a way to engage communities on a continuing basis.

➤ **New tools are described in sufficient detail so as to allow for further development**

The additional strategies mentioned above are described in detail and can be further developed.

➤ **One or more parties take ownership of developing all strategies and tools included in the plan(s)**

This has yet to happen, and realistically not all strategies will be developed due to resource constraints. Each region will need to prioritize certain strategies to implement based on regional and local interest as well as financial and political feasibility.

➤ **Model language for use by municipalities and the regions is developed**

The Vermont Natural Resources Council (VNRC) is currently reviewing forestland conservation planning strategies that exist in the state and developing new planning templates for municipalities. So as not to duplicate efforts, we provided input but left the model language development to VNRC. When it becomes available, all regions have agreed to distribute the planning templates publication to our towns. Forest policies have been generally neglected at the local level and this initiative has moved them to a higher profile.

➤ **Draft and final reports are completed**

Each region completed a draft of their report by April 2012, and those reports were subsequently reviewed by the lead RPC, Lamoille County Planning Commission, and revised by each RPC. In June 2012, Final reports were submitted and accepted by Lamoille County Planning Commission. A unified report for all regions was submitted to the USDA Forest Service by the contract closing date. The resulting landscape-based forest stewardship plans provide improved baseline data for understanding forests while presenting strategies for conservation that include public-private partnerships and enhancing the economic, ecological and social values of private forestland.

4) Objective: Develop a process that can be replicated across regions and landscape scales

Because four regional planning commissions participated in the project, the result is much more robust and replicable than if the work were contained within one organization or one particular region of the state. The plans were specifically designed to serve as models for other planning agencies, and staff and volunteers involved in the project are available to present the plans and discuss the process with other interested parties. The project utilized standard GIS technology and documented stakeholder engagement processes to develop model landscape-scale forest stewardship plans that can be replicated by other planning organizations in any other area. Issues identified through the geographic analysis and stakeholder engagement process were unique to each region, and the systems used flexible enough to be used at a variety of distinct levels - regional, municipal, and parcel specific. During the next phase of this project, four additional Regional Planning Commissions in Vermont will replicate the process that we developed.

5) Objective: model a collaborative process across regions and agencies for forest stewardship planning

The project Regional Planning Commissions coordinated efforts through periodic joint meetings which were attended by Northeastern Area Association of State Foresters (NAASF) representatives and other partners. Input and advice from NAASF workgroups, including the Landscape Stewardship Guide, were incorporated into the project. Information on the project was publicized on regional planning commission websites to facilitate information exchange and comment.

Future Recommendations

As a pilot project, Landscape-Based Forest Stewardship Planning - A Regional Approach established a template that other regions can use to develop their own Regional Forest Stewardship Plans. During the process of developing a template for Regional Forest Planning, mistakes were made and valuable lessons learned. So that others do not have to “reinvent the wheel” and to aid other regions developing Forest Stewardship Plans, the following suggested guidelines are presented here:

1) Define planning objectives and scope early on:

The template developed during the pilot project had several common elements:

- Common map set of forest resources and constraints
- Common report sections
 - Regional Characteristics
 - location and land cover
 - demographic and economic trends
 - land use trends
 - forest characteristics
 - Forest Resource Values

- Economic
 - Ecological
 - Recreational and Scenic
 - Cultural
 - Water resources
 - Wildlife habitat
- Forest Resource Threats and Limitations
 - Environmental threats (acid rain, ozone, air quality, climate change, natural disturbances, invasive species)
 - Human threats such as incompatible development and fragmentation
 - Economic conditions
- Landscape Zones and Priority Areas (process for designating these needs to be clearly defined)
- Existing Forest Conservation Measures
 - Conserved lands
 - Private lands and UVA program
 - Regional Plans
 - Local Plans and land use regulations
 - Conservation Commissions and organizations
 - Private landowner associations
 - Advocacy organizations and associations
- Additional Forest Stewardship Strategies
 - Land Use regulations (lists various tools that local communities can use to support forest conservation and a forest-based economy)
 - Cooperative management and marketing
 - Strategies to create and support forest-based economic opportunities
- Public outreach plans were drafted
- Economic resources section included data on regional sawlog and veneer harvest trends and number of sawmills from 2000-2010, regional forestry employment trends from 2000-2010, regional maple sugaring industry trends from 1997-2007, and regional Christmas tree farm trends from 1997-2007. **Note: the available data is by County rather than Regional Planning Commissions.** This necessitates a compromise for certain regions whose boundaries cross county lines; those regions will need to choose the most appropriate counties to represent their region.
- Analysis of Regional Plan language and how it addresses forest resources – how can it be strengthened?
- Analysis of municipal plan language and how local plans address forest resources. Using VNRC’s Forest Conservation Strategies Matrix⁷⁹, extract local plan language and evaluate how such language can be strengthened.

In addition to these common elements, you may choose to focus on a particular issue to analyze in more depth. For example, Addison region hired an intern to conduct regional and town-specific forest landscape change analyses. Such analyses can prove to be a valuable tool to engage the communities. Two-Rivers Ottauquechee emphasized outreach and education, while

⁷⁹ Vermont Natural Resources Council, 2011.

Bennington focused on biomass development and regional sustainability. Regional focus areas or issues will largely be driven by the Steering Committee's interests.

2) Identify regional stakeholders and reach out to them in the interest of forming a diverse Forest Stewardship Steering Committee:

It's critically important to the success of implementing a Regional Forest Stewardship Plan that all key stakeholders in the region are involved from the outset in the development of the plan. There is a broad range of stakeholders in forest resources, including natural resource managers, ecologists, foresters, loggers, forest product manufacturers, outdoor recreationists, forest landowners and others. Even though the process of developing a plan with lots of diverse interests contributing their input can seem cumbersome and drawn out, the resulting Forest Stewardship Plan will be much more likely to engage the community if it has the support of the entire suite of interested stakeholders. Be prepared to spend some time at the outset forming the Steering Committee. Hold a public meeting about the project, do a mailing that reaches out to different stakeholders, meet with key players one on one. The time put into initial outreach will be well spent and will result in a more comprehensive, well thought-out plan.

3) Develop a regular schedule for Steering Committee meetings and adhere to that schedule; for each meeting, assign a specific topic for discussion:

Don't neglect the Steering Committee meetings. While it may be tempting to postpone meetings past the first year of the project, realize that it will require several (8-12) meetings to accomplish the objective of developing a Forest Stewardship Plan. Set a regular meeting schedule of a certain day each month or every other month and stick to that schedule. You may want to spend the first few meetings having broad open-ended discussions and brainstorming sessions, to allow the members of the Committee to get to know and feel comfortable with each other. However, the majority of meetings should have a well-defined agenda focusing on specific topics with clear objectives. Take good notes during the meetings, as these will provide much of the substance of the Stewardship Plan later on. After repeated meetings, patterns will emerge – regional issues and concerns will come to the forefront that will provide the focus for the development of regional priorities and strategies.

4) Give committee members ample opportunities to provide input on the Plan:

During the course of regular Steering Committee meetings, have the Committee members review sections of the plan as they are drafted. Then incorporate the Committee's input into section revisions. Post the Plan Sections on a website and also make hard copies available to Committee members.

5) Draft a public outreach plan early on and adhere to it:

The public outreach plan can include the Steering Committee meetings themselves; encouraging Steering Committee members to talk to others in their sector about the project; meeting with town Conservation Commissions; targeted outreach to key stakeholders not on the Steering

Committee; consultations with Statewide organizations, Watershed Associations and State entities such as the Agency of Natural Resources; presentations to Regional Directors, and a public meeting/presentation at the end of the project. Future outreach should target communities to garner support for the implementation of specific forest stewardship projects.

6) Inventory the GIS data needed for the mapping component; develop a plan to address data gaps:

The majority of GIS data needed for the standard map set is statewide data available from the Vermont Center for Geographic Information (VCGI), Vermont Department of Forests, Parks and Recreation, and Vermont Department of Fish and Wildlife. As stated earlier in this report, Use-Value Appraisal (UVA) parcel data is not readily available in all regions and may need to be developed by the RPC. Each region will need to assess the feasibility of developing such a dataset, given resource constraints. It may be possible and desirable to use the services of an intern to develop the dataset. It is also desirable from a statewide perspective to use consistently defined data standards so that any data developed can be exchanged with other regions. Each region may also wish to develop a dataset of forest producers, or other datasets as the need arises. As with the UVA parcel data, it is important to establish and adhere to consistent statewide standards. Such standards should be developed by VCGI.

7) Create maps of regional forest resources and constraints/threats; use these maps as an analysis and assessment tool:

Using datasets described previously in the Methods section of this report and datasets developed as outlined above, create a set of the following maps:

- 1) Biophysical Regions and Land Cover
- 2) Forest Productivity and Timber Resources
- 3) Habitat Blocks
- 4) Ecological Resources
- 5) Recreational Resources
- 6) Water Resources
- 7) Conserved Lands and Use-Value Appraisal Parcels
- 8) Resource Constraints: Human and Environmental
- 9) Forest Stewardship Potential

By highlighting the location of different types of forest resources and barriers/threats to forest stewardship, the maps provide a visually compelling qualitative assessment of forested landscapes that can be used to help identify priority landscapes. Depending on the Steering Committee's interests, certain regions may wish to create additional maps that highlight regional issues and priorities.

8) Define a process to identify landscape types and priority landscapes:

The identification of landscape types and priority landscapes was arguably the most challenging aspect of this project. We used two different methods to define and identify landscape types: 1) Following the example of the Vermont State Assessment & Resource Strategies Plan and using

the GIS data layer developed for the plan, Lamoille characterized landscape types as rural, rural-residential or urban; 2) Bennington and Addison used their Regional Plans to define and identify landscape types. Since a uniform process was never clearly defined, the four regions involved in this project did not have the opportunity to meld their different approaches. To some degree, the delineation of landscape types felt arbitrary and artificial; consequently, the attempt to connect planning and conservation strategies to landscape type wasn't always compelling. While the recognition of different landscape types has value in applying appropriate stewardship strategies, there is no one system of landscape type delineation that will fit all regions. Each region needs to define their own process to accomplish this step, yet the approaches used need to have some degree of consistency across regions.

Likewise, a consistent approach needs to be established for the identification of priority landscapes. During this project, there was a focus in the early stages on using the model developed for the Vermont Spatial Analysis Program (SAP) or on trying to adapt that model to individual regions. Due to time constraints, the regions involved in this project were unable to agree on a particular modeling approach to take or even if modeling should be a part of the planning process, let alone develop any new models. The raw map set developed by each region was a useful tool in engaging stakeholders on the Steering Committees to identify priority areas; however, lacking a modeling approach, it was difficult to aggregate all of the information presented in the different maps into a cohesive picture.

In addition to creating a map set using raw data, it would be useful to develop a model to help identify priority areas. There are numerous approaches that can be employed, resulting in one or many maps, a "pixel scale" display or one aggregated to a larger unit such as a political boundary or watershed, separate maps of priority areas for each landscape type, priority area maps separated by issue, etc.⁸⁰ Although each region may choose to incorporate different datasets into a model or assign different weights to datasets depending on regional priorities, a unified approach should be discussed and determined at the outset of the planning process. Any modeling approach used should not be overly complex. In the interests of saving time and money, and to avoid replication of efforts, previously developed models should be used if deemed appropriate.

Using GIS methodology to identify and prioritize forest landscapes requires a well-thought out process; compiling the data and developing the process itself takes time. Data gaps and outdated data present an additional challenge. This highlights the need for a proactive strategy for more consistent development, updating and maintenance of needed datasets. Additionally, sharing datasets, analysis methods and other information is instrumental to the success of future regional forest stewardship projects.⁸¹

⁸⁰ 2010 Statewide Forest Resource Assessments and Strategies in the Northeast and Midwest: A Regional Summary. Sherri Wormstead, Tom Luther, and Martina Barnes (USDA Forest Service, Northeastern Area Association of State Foresters), 2011.

⁸¹ Northeastern Area Association of State Foresters), 2011.

9) Identify issues unique to your region:

Through the processes of creating maps of forest resources and constraints, gathering economic data (state harvest reports, forest related employment and wages, maple syrup and Christmas tree statistics), Steering Committee meetings and other outreach, regional issues and priorities will emerge that will inform the focus or focuses of the Regional Forest Stewardship Plan. It is important to start the data gathering as soon as possible in order to recognize pertinent issues and establish a clear direction based on those issues.

10) Identify unique tools and strategies used in your region; or case studies of existing tools and strategies applied in a unique way:

Many of the forest stewardship strategies identified during this pilot project are not region specific and can be referenced in future regional forest stewardship plans. Rather than simply restating all the strategies, research how those strategies have been or are being used in your region; come up with descriptive case studies of existing tools and strategies applied in a unique way, and if any exist, identify tools and strategies unique to your region.

11) Be prepared to spend a significant amount of time on developing and refining regional goals, strategies to achieve those goals, and specific actions to implement the strategies:

Engaging stakeholders in the process of developing regional goals, strategies and actions, and the input contributed by stakeholders was one of the greatest benefits of this project. Stakeholder involvement, from initial outreach to completion of the landscape forest stewardship plan, does require much more time than drafting a plan without any input from stakeholders or partners. Although the process of involving public input in a plan is laborious and time consuming, the end product is much more robust, key stakeholders are invested in it and the community will be more likely to support it if they feel like they had an opportunity to contribute. The end result is well worth the extra effort.

12) Finally, start drafting the Regional Forest Stewardship Plan as early as possible:

Developing a regional forest stewardship plan within a two-year time frame is challenging. While the mapping, research, coordination and outreach components all take considerable time to accomplish, the writing of the plan is equally time-consuming. It will take time to thoughtfully organize and analyze the data gathered from research and from stakeholder input into a cohesive document that is both engaging and informative. Allowing sufficient time to coalesce the components and digest the information, draft the report, solicit feedback and make revisions will result in a much stronger plan.