

DESIRED FUTURE CONDITION: CONSERVE BIOLOGICAL DIVERSITY

Conserve native biological diversity across all landscapes

OVERVIEW

Biological diversity encompasses the staggering “complexity of all life at all its levels of organization, from genetic variability within species, to species interactions, to the organization of species in larger landscape units.”³

Biodiversity is critical for the sustainability of Vermont’s forests because it enables ecosystems to respond to external influences, to recover from disturbances, and to support important ecological processes. All components of a given ecosystem are tied together in an intricate web, and alterations can have dramatic impacts on the entire system.

Connections between forest communities are essential to fundamental ecological processes and the future of biological diversity associated with forests. The breaking up of habitats into smaller, non-contiguous patches through land conversion can render critical habitats inaccessible, isolating populations and degrading remaining habitat patches through edge effects that favor edge-tolerant species, as well as invasive exotic species that can out-compete native and rare species. The result of habitat fragmentation is often increased predation, increased mortality, reduced mobility of forest plant and wildlife species as well as changes in habitat micro-climates.

It is critical that Vermont’s forests contain healthy and sustainable populations of native plants and animals. The primary objective of the conservation of biological diversity is the survival of species and their genetic variability. By conserving biodiversity, species that make up forests should have the ability to function, reproduce, and remain productive.

Some of the measures of successful conservation of biodiversity are the proportion of forested land in Vermont, the size and integrity of forest blocks, and the variety and health of tree species within a forest. We use spatial information as a tool to view the location, ranking, and value of forest ecosystems across the landscape to assist with strategic planning. We also acknowledge the need for more research to determine long-term impacts of

³ Vermont Department of Fish and Wildlife. 2005. Vermont Wildlife Action Plan. www.vtfishandwildlife.com.

acceptable management practices on biodiversity in maintaining a balance between ecological, social, and economic values and benefits.

ASSESSMENT

ASSESSMENT: ECOLOGICAL MAPPING

Various levels of ecological mapping have been developed to help identify areas with similar features. These maps are valuable planning tools to assist in managing Vermont's landscape.

VERMONT CONSERVATION DESIGN

In 2014-2015, the VFW and partners including Vermont Land Trust, the Division, The Nature Conservancy, and the Northwoods Stewardship Center produced 'Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape.'⁴ This report identifies coarse-filter conservation targets for landscape-scale features, including forest blocks, riparian areas, wildlife and landscape connectivity, and physical landscape diversity that are necessary to effectively conserve many finer scale conservation elements in the face of climate change, forest fragmentation, and habitat loss.

BIOPHYSICAL REGIONS

Biophysical regions are large-scale ecological areas of similar climate, geology, vegetation, and human history, generally in units no smaller than 200,000 acres. Climate, geology, topography, hydrology, and land use history combine to create eight biophysical regions that have been identified in Vermont, five of which extend into neighboring states and the province of Quebec. The biophysical regions are:

- **NORTHEAST HIGHLANDS:** Granite bedrock dominates this cool region, which is characterized by extensive wetlands, remote mountains, and lakes and ponds. Spruce and fir dominate the lowlands as well as the high elevations, whereas northern hardwoods cloak the mid-elevations. Forty-three percent of this region is conserved, the highest percentage of any of Vermont's biophysical regions.

⁴ Vermont Fish and Wildlife Department, Vermont Conservation Design, 2016, www.vtfishandwildlife.com/get_involved/partner_in_conservation/vermont_conservation_design.

- **NORTHERN VERMONT PIEDMONT:** Calcium-rich soils combine with a cool climate to support mixed forests and northern white cedar swamps, fens, and other interesting natural communities in this region. The uplands have fine agricultural soils, but a short growing season. Eight percent of the area is conserved.
- **SOUTHERN VERMONT PIEDMONT:** Calcium-rich soils and rolling hills make this a good place for agriculture. The climate is average for Vermont, except in the extreme southeast where it is quite warm. Northern hardwoods and red oak are the predominate vegetation. Seven percent of the region is conserved.
- **SOUTHERN GREEN MOUNTAINS:** A broad plateau is dotted with a few dominant peaks and several ski areas. The climate is cold and rainfall is relatively high. Northern hardwoods, spruce, and fir dominate, and there are several small lakes and ponds. Thirty-three percent of this region is conserved.
- **NORTHERN GREEN MOUNTAINS:** This area has a cool climate and high elevations and is mostly forested. Northern hardwoods dominate the side slopes, whereas high elevations have spruce and fir as well as alpine meadow habitat. Twenty-six percent of the region is conserved.
- **CHAMPLAIN HILLS:** This region is transitional between the Champlain Valley and the Northern Green Mountains. Northern hardwood forests dominate on the low hills, but oak-pine forests extend up the major river valleys where there are warmer conditions.
- **CHAMPLAIN VALLEY:** This region of Vermont has a warm climate and abundant fertile farmland. The Champlain Valley contains both northern hardwood forest and various species of oaks and hickory. It has some of the state's most significant natural diversity but also includes Vermont's most densely populated areas. Nine percent of the region is conserved.
- **TACONIC MOUNTAINS:** The slate belt of Vermont and New York is found in this region. The Taconics are dramatic wooded hills dominated by sugar maple, beech, and yellow birch forests. Found on the lower elevation knolls are dry oak and hickory forests, while spruce and fir occur at the highest elevations. Ten percent of the region is conserved.
- **VERMONT VALLEY:** The Marble Valley has marble and limestone with glacial deposits on the valley walls, abundant springs, and wetlands. About 10 percent of the region is conserved.

NATURAL COMMUNITIES

Natural communities are mapped at a scale ranging from less than an acre in size (vernal pool) to over a thousand acres (northern hardwood matrix forest). In 2000, Vermont's natural communities were described in the publication

of *Wetland, Woodland, Wildland - A Guide to the Natural Communities of Vermont*. Natural communities are ranked as to their scarcity and sensitivity, and this information is valuable in determining Vermont's priority landscapes. Natural communities are mapped on public land as part of the long-range management planning process. Significant natural communities are eligible for enrollment in Vermont's Use Value Appraisal (UVA) program implementing management that protects their condition and status.

VERNAL POOLS

Vernal pools are one of the most unique habitats in Vermont and are a critical element of the state's native biological diversity. These temporary water bodies form during winter rains or when snow melts, and occasionally when groundwater fills a depression in the ground. Species that use and depend on vernal pools for reproduction or other functions, mating and laying eggs include salamanders, frogs and toads, turtles, clams, seed and fairy shrimp, water fleas, snails, fingernail clams, leeches and a wide variety of aquatic insects. For these species vernal pools are essential breeding habitat. No one knows how many vernal pools exist, or have been eliminated in Vermont.

ASSESSMENT: VERMONT'S FORESTED LANDSCAPE

At 74% forested, Vermont is the fourth most forested state in the United States.⁵ The percentage of forest cover increases from west to east, mostly due to the belt of agricultural and developed land in the Champlain Valley. Forests had covered Vermont well before it was a state, though many changes in the nature and extent of our forests have occurred over the long course of Vermont's history, primarily a result of human use, particularly agriculture. Vermont was heavy to agriculture in the early to mid-1900's, but as farms were abandoned, the percentage of forests increased considerably. Now forest cover in Vermont has leveled off and is beginning to decrease slightly.

⁵ Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database. U.S. Department of Interior, U.S. Geological Survey. January 2016, www.mrlc.gov/.

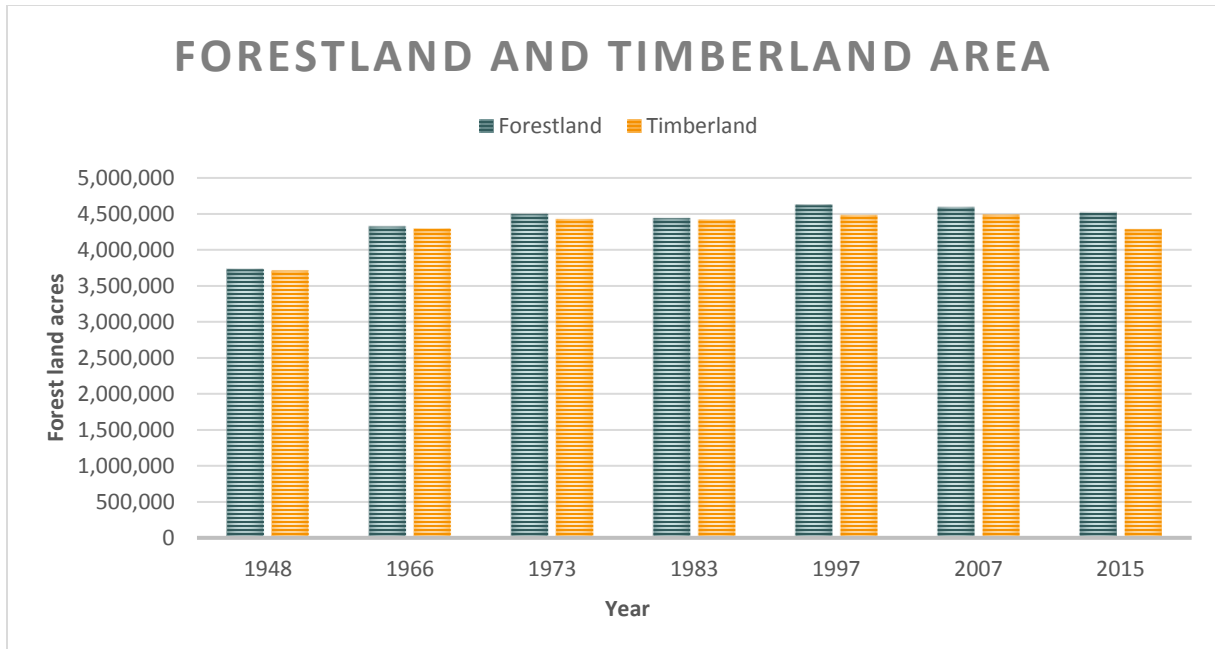


Chart 3: Forest Land and Timberland Area. Forest land currently has tree cover or used to have tree cover and is expected to see that cover restored and Timberland is forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation.

In 2010, there were 4,580,000 acres of forest land, and in 2015 there were 4,511,000 acres, a 1.5% decrease⁶. Of this forest land, 4.3 million acres, or 95% is considered timberland, productive forest land that is available for harvest (Chart 3). It should be noted that timberland acreage could be unavailable for actual timber harvesting due to landowner objectives, topographical constraints, and accessibility. Due to current inventory methodology, resulting data also fails to capture all the urban forest resources that do not meet stocking levels required to be considered part of the forest, but these street, park, and neighborhood trees, riparian corridors, and small forest patches contribute considerably to the ecological, social, and economic value of Vermont’s forests. Statewide, urban land in Vermont covers 169,000 acres and has an estimated 11.9 million trees and a tree canopy cover of 36%⁷. As of 2016, Vermont is participating in a new federal initiative to add urban areas to the Forest Inventory and Analysis (FIA).

Vermont lies within a natural transition zone where northern and southern forests converge. Much of the state’s forest land is covered by northern hardwood forests - maple/beech/ birch (Chart 4). At higher elevations and northern latitudes, softwood forests - spruce/fir - dominate; these are ecologically important, but cover a relatively

⁶ Forest land is defined as currently has tree cover or used to have tree cover and is expected to see that cover restored USDA Forest Service Forest Inventory and Analysis, Northern Research Station. 2015, www.fia.fs.fed.us.

⁷ Nowak, D. J. and Greenfield, E. J. 2008. *Urban and Community Forests of New England*. s.l. : USDA Forest Service.

small area (Chart 5). The second most abundant forest type are the mixed hardwood-softwood forests that occupy the transition zones between the two types as well as abandoned farmland. Other significant types include forested wetlands, which can be either hardwood or softwood and are scattered throughout the state, white pine forests at 10%, small amounts of oak/hickory forests found in the Champlain Valley to the west and the Connecticut River, and aspen/birch forests on abandoned farmland primarily at the lower elevations.

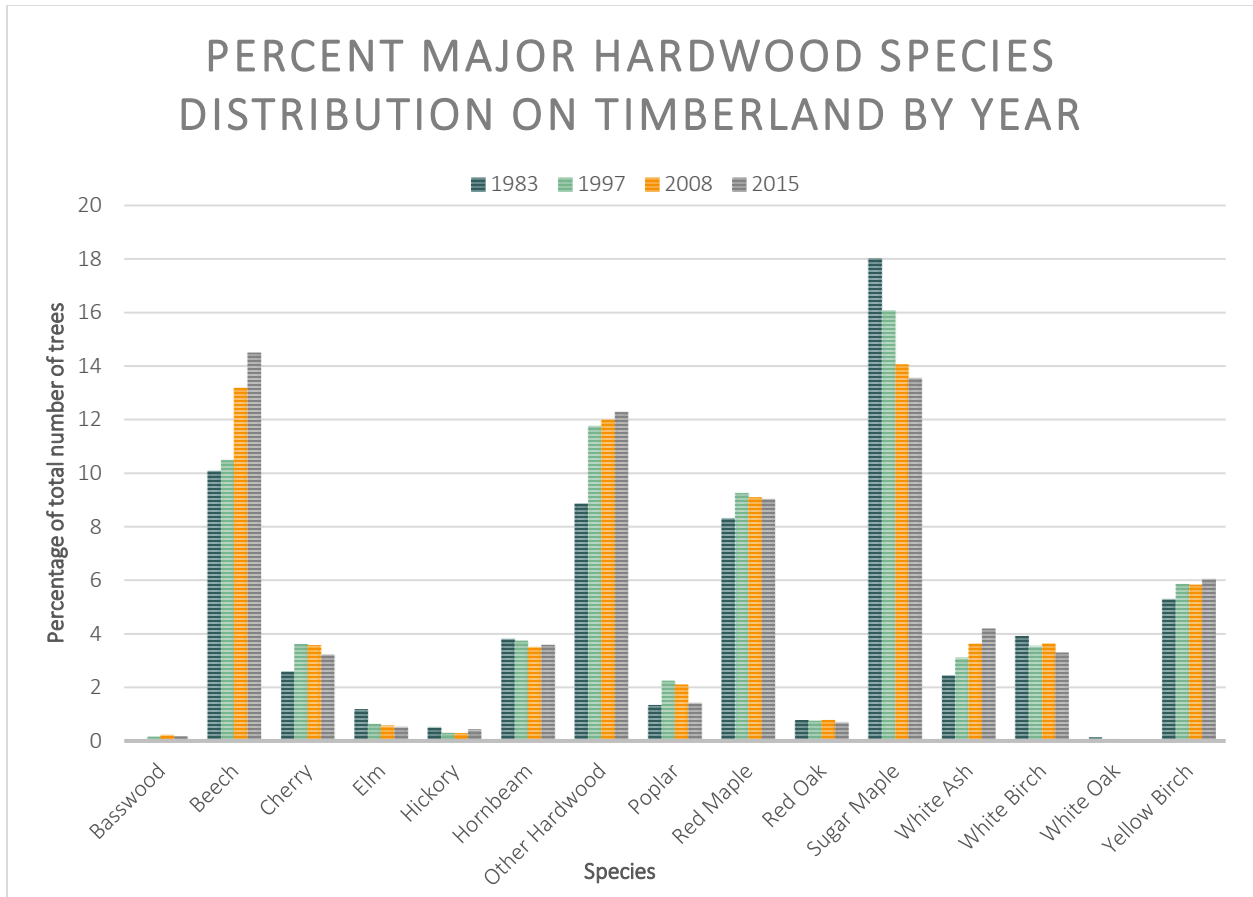


Chart 4: Percent live hardwood species on timberland by year.

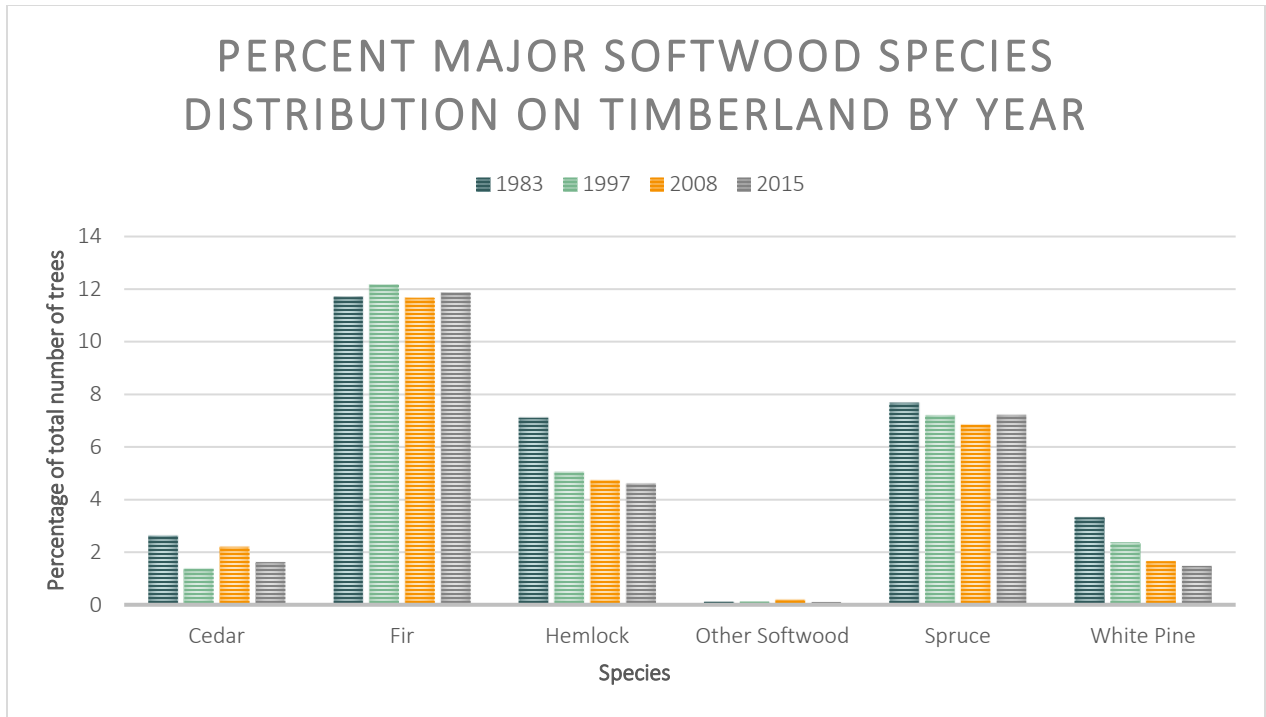


Chart 5: Percent live softwood species distribution on timberland.

FOREST INVENTORY AND ANALYSIS

The USDA Forest Service’s Forest Inventory and Analysis (FIA) program of the Northern Research Station conducts inventories and provides an overview of Vermont’s forest resources. Since 1999, FIA has employed staff to conduct annualized inventories in a portion of Vermont. The FIA program is the only source of data collected from a permanent network of ground plots nationwide that allows comparisons to be made between states and regions.

FIA highlights⁶:

- Vermont has over 4.5 million acres of forest land. Although Vermont’s area of forest land has been relatively stable since the late 1990s, there has been a gradual decline in forest area since 2010 that has resulted in a 1.5 percent decrease.
- From 2010 to 2015 there has been a net 69,000-acre loss due to development. Although this is relatively stable and within the margin of sampling error, Vermont’s forest land base is currently trending toward an incremental decrease.
- Since 2010, the volume and biomass of trees have risen slightly.
- Timber harvesting volume is declining although the rate of decline has slowed; it is down by almost 25% since 2007, but only 4% since 2010.

- There is more growth than removal. The current level of removal is sustainable, barring any significant increase in tree mortality.
- Private landowners own 80% of Vermont’s forest land.
- Tree crowns are healthy across Vermont.
- Invasive plants continue to spread and appear to be effecting regeneration of important tree species.

More information on Vermont’s FIA can be found at:
fpr.vermont.gov/forest/forest_business/forest_statistics/fia

ASSESSMENT: LAND USE TRENDS

The ability to maintain biological diversity is closely related to land use trends, which are influenced by population, housing density, demographics, transportation, and development. Though the state is still heavily forested, land conversion through development is putting pressure on Vermont’s forests. Forests are intermixed with developments and are impacted by other factors such as recreation, invasive plants, and other local human effects. Additionally, conversion, fragmentation, and parcelization of forests affect forest health, sustainability, management opportunities, and a myriad of other characteristics.

Forest fragmentation is the breaking of large, contiguous forested areas into smaller pieces, typically by major roads, agriculture, subdivisions, or other human development. It occurs incrementally, beginning with cleared swaths or pockets of non-forest within an otherwise unbroken expanse of tree cover. Over time, non-forest pockets tend to multiply and expand and eventually the forest is fragmented and reduced to scattered, disconnected forest islands. The remnant forest islands resulting from fragmentation are surrounded by land uses that threaten the health, function, and value of those forest islands for both animal and plant habitats, and human use. As forest fragments become ever smaller, practicing forestry can become operationally impractical, economically nonviable, and culturally unacceptable. In turn, we lose the corresponding and significant contributions that forestry makes to our economy and culture.

Although Vermont remains the fourth least populated and second most rural state nationwide, it is predicted that the population growth rate is likely to increase. By 2030, Vermont is expected to have an additional 85,000 residents compared to 2013⁸. As we anticipate this growth, we know that the urban areas of Vermont will need to continue to plan for accelerated population growth. Many of the rural communities will be confronted with population increases and the pressures associated with ongoing development in preferred forested areas.

⁸ U.S. Census Bureau, Population Pyramids for Vermont, www.census.gov/population/projections/files/usinterimproj/51PyrmWY3.pdf, 2016.

Grand Isle County, or the towns more commonly referred to as the Champlain Islands, experienced rapid population growth during the 1990's. Since then growth has been slow but steady and is expected to continue. Other rural areas may see similar population growth rates. In 2014, building permits were issued for 1,546 household units, an increase of about half a percent to the state's housing supply⁹. Continued population growth, however incremental, eats away at Vermont's valued forest land base.

ASSESSMENT: VERMONT'S USE VALUE APPRAISAL PROGRAM

Concerned that high property taxes were forcing forest and agricultural landowners to sell to developers, Vermont passed the Use Value Appraisal Law (UVA) in 1978. The program provides a property tax reduction for qualifying landowners engaged in forestry and agriculture. Instead of assessing property taxes based on the potential development value, UVA assesses property taxes based on the current use of those working lands for forestry or agriculture, resulting in a significant tax reduction for enrolled parcels. Forest land may be eligible by enrolling at least 25 contiguous acres, which must be managed according to a forest management plan and map approved by an FPR county forester. FPR administers the forestry component of the program in coordination with Vermont Department of Taxes.

The UVA program is successful at meeting its stated goals outlined in the law: to encourage and assist the maintenance of Vermont's productive agricultural and forest land; to encourage and assist in their conservation and preservation for future productive use and for the protection of natural ecological systems; to prevent the accelerated conversion of these lands to more intensive use by the pressure of property taxation at values incompatible with the productive capacity of the land; to achieve more equitable taxation for undeveloped lands; to encourage and assist in the preservation and enhancement of Vermont's scenic natural resources; and to enable the citizens of Vermont to plan its orderly growth in the face of increasing development pressures in the interests of the public health, safety, and welfare¹⁰.

In 2016, 14,916 parcels were enrolled in the Forest land or Conservation land category, totaling over 1.8 million forested acres requiring forest management or conservation plans. The program is increasingly making a positive difference for Vermont, its forests, its landowners, and the economy. In the last five years, 41% of enrolled landowners reported harvesting sawtimber, with 57% intending to harvest sawtimber in the next five years¹¹. More than 342 thousand cords or volume equivalent was reported to have been harvested from lands enrolled in UVA in

⁹ U.S. Census Bureau, Building Permits Survey, www.census.gov/construction/bps/stateannual.html, 2014.

¹⁰ 32 V.S.A. § 3750- 3763

¹¹ Sarah M. Butler, Brett J. Butler, Jaketon H. Hewes, "Vermont Woodland Owner Survey 2014 Final Project Report". December 2014.

2015. More than 50% of Vermont's privately owned forest land is enrolled in this program, and it continues to grow by an average of 300 parcels and 30,000 acres annually.

There are significant cultural implications to the program as well. The National Woodland Owner Survey¹² report indicates that the primary concern of forest landowners in Vermont is property taxes, which UVA helps to ameliorate. For UVA enrollees, the next highest rated concerns include keeping the land intact for future heirs, protecting water quality, and preparing for unwanted insects and diseases. These concerns are rooted in issues that have broad implications for the capacity of forests to provide public benefits and differ from those of unenrolled landowners.

The UVA program serves as the basis for Vermont's landscape scale stewardship planning into the future. More than 3.4 billion dollars of annual economic activity and 20,000 jobs can be attributed to Vermont's forests through the forest industry, and forest-based recreation and tourism. With 80% of Vermont forested land privately owned, conservation and wise management of private forest land are critical to the ability of Vermont's forests to provide its many benefits. Vermont county foresters dedicate approximately 60% of their time to administering the UVA program. The program is more than a tax abatement program, it serves as an open door for providing technical assistance to landowners, discussing stewardship values and education on the ecological significance of each parcel. No other program in Vermont more efficiently supports these lands and owners, and it is vital to maintain support for state policy that recognizes the importance of Vermont's working landscape.

ASSESSMENT: LAND CONSERVATION

Since the first official state forest, L.R. Jones State Forest, was acquired in 1909, Vermont's ANR has acquired over 350,000 acres of land in more than 200 towns for recreational and conservation purposes, with parcels ranging in size from several acres to several thousand acres. Since 1991, ANR has acquired conservation easements on approximately 55,000 acres of privately owned forest land and public access easements on nearly 84,000 acres. These lands are managed for a variety of conservation purposes including recreation, wildlife habitat, forest products, and flood water flowage.

A principal source of funding for state land acquisition is the Vermont Housing and Conservation Trust Fund. Since 1987, total state funding for ANR land acquisition through the trust fund has ranged from \$500,000 - \$3 million annually (not including the 1999 legislature's special one-time appropriation of \$4.5 million for the Champion Lands Project). ANR uses private and federal funds to leverage limited trust fund monies. The Vermont Duck Stamp Fund, a program through the VFW is also a major source of funding for the acquisition and enhancement of wetlands in the

¹² USDA Forest Service, Forest Inventory, and Analysis National Program, National Woodland Owner Survey, 2014, www.fia.fs.fed.us/nwos/.

state. Two key federal programs also support land acquisition in Vermont: The Land & Water Conservation Fund, which targets outdoor recreation, and the Forest Legacy Program, designed to prevent the conversion of forests to non-forest uses.

Since privately owned property dominates the Vermont landscape, the use of conservation easements and donations of land, or through other management plans, will continue to play a leading role in conserving Vermont's forested landscape. A network of state, regional, and local land trusts work with landowners to conserve forested properties including family woodlots, riparian areas, sugarbushes, and mountain ridgelines. In 2013, Vermont had a total of 463,373 acres under nongovernmental, nonprofit conservation easements¹³; a significant amount of this is forested. Easements are an important tool to conserve private lands by keeping them economically viable, and it is a primary strategy to prevent further loss of forest cover. With success comes responsibility, as easement monitoring and stewardship assistance have become an increased burden on personnel time. Cooperation with local conservation organizations will be critical in the coming years to ensure that legal obligations are met; easement monitoring is a priority under this 2017 Plan.

PRIORITY LANDSCAPES AND FOCUS AREAS

PRIORITY LANDSCAPE: FOREST LEGACY PROGRAM

The Forest Legacy Program (FLP) is a federal grant program designed to protect forest lands from conversion to non-forest uses. Most forested land in Vermont is held in private ownership, and these landowners are facing growing financial pressure to convert their land to uses that would remove them from the forested land base.

FPR works jointly with the USDA Forest Service to administer the FLP. The goals of Vermont's Forest Legacy Program are to protect: large contiguous and productive forest blocks; habitats for wildlife dependent on large contiguous forest blocks; threatened and endangered species habitat; State fragile areas and undeveloped shoreline; significant wetlands; and important recreation corridors.

FLP requires each state to select areas where the most valuable forest lands face the greatest threats, and complete an Assessment of Need (AON) to focus federal investment on priority landscapes or Forest Legacy Areas. The Forest Legacy Areas identified in the Vermont AON are mapped and represent the areas in which potential Forest Legacy

¹³National Conservation Easement Database, www.conservationeasement.us/. 2014

parcels should be considered for conservation, and encompasses 2.6 million acres or about 44% of Vermont's total acreage.

Vermont has participated in the program since its commencement with several Forest Legacy projects completed (view completed projects) and several more in progress. One notable achievement of Vermont's program has been the Mt. Holly Wildlife Corridor effort that protected the area between the northerly and southerly units of the Green Mountain National Forest.

PRIORITY LANDSCAPE: FOREST LAND ELIGIBLE FOR UVA BUT NOT ENROLLED

With 80% of Vermont's forests in private ownership, one of the highest priorities for the Division for this planning period will be to maintain and enhance forest integrity and connectivity on private lands. The UVA Program has been very successful in keeping forests as forests and will remain a focal point and central strategy for our work on private lands. Currently 1,890,232 forested acres are enrolled in UVA and require management plans. Over half of the eligible privately owned forested land in the state is enrolled. However, it is estimated that there are still at least 1 million acres of potentially eligible forest land not enrolled. These lands represent an opportunity to increase landowner engagement, bringing more land under forest stewardship and thereby maintaining forest integrity. Expanding FPR's county foresters' capacity, targeting education and outreach to high priority forest habitats blocks, connecting wildlife corridors, simplifying, and streamlining program requirements and administration, and developing partnerships will help us reach these goals.

PRIORITY LANDSCAPE: HIGH ECOLOGICALLY FUNCTIONING FORESTS

This priority landscape focuses on existing forest blocks identified through analysis using geographic information systems. We link to a central component of the Vermont Wildlife Action Plan, the 'Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape¹⁴' This report identifies coarse-filter conservation targets for landscape-scale features including forest blocks, riparian areas, wildlife and landscape connectivity, and physical landscape diversity that are necessary to effectively conserve many finer scale conservation elements in the face of climate change, forest fragmentation, and habitat loss.

To build the Vermont Conservation Design, the VFW conducted an analysis of non-fragmented forest blocks in Vermont¹⁵. Each of 4,055 forest blocks was analyzed and ranked for biological and physical diversity factors.

¹⁴ Sorenson et al, Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape. 2015.

¹⁵ Sorenson and Osborne, Vermont Habitat Blocks and Habitat Connectivity: An Analysis using Geographic Information Systems. 2014.

Vermont's largest forest block is 153,000 acres and the average block size statewide is 1,000 acres. Block size is not evenly distributed across the landscape.

To maintain Vermont's high ecologically functioning forest lands, continued investment in strategic conservation projects is necessary, targeting parcels that pose a conversion risk. High-value parcels include those located within or adjacent to existing blocks of conserved forest land, ranking high in the VFW forest block assessment, meeting USDA Forest Service Forest Legacy goals, and providing necessary climate adaptation and regional connectivity functions. Other priorities include parcels with long-term contracts to provide sustainably harvested wood for in-state processing and consumption, which facilitate the intergenerational transfer of forest blocks, and that shift large tracts into alternative ownership models, such as cooperatives where the land is managed as one large tract.

PRIORITY LANDSCAPE: CONSERVED LANDS

Conserved lands in Vermont, both public and private, provide an essential land base on which to carry out the strategies in this plan. According to Landscape¹⁶, 31.3% of Vermont is conserved either through public ownership or easement – a success story in the efforts to conserve Vermont's forests. Publicly owned properties, 925,600 acres in 2014, are an important part of the Vermont landscape, as they exist in perpetuity for use and enjoyment by Vermonters and visitors. Vermont's state parks, state forests, wildlife management areas, National Forest, National Wildlife Refuges, municipal lands, and other public lands provide Vermonters with numerous opportunities for recreating, working, enjoying nature, and simply getting away to a peaceful place.

With this success comes the demand to steward public property actively and wisely to maximize the benefits they provide, including sustaining important habitat, watershed protection, and supporting the working landscape. Hundreds of thousands of people visit our state each year to view our landscape and enjoy the bounty of our natural resources, along with Vermonters that enjoy the services these lands provide. Sustainably managing these lands will be a priority by offering a land base for carrying out our strategies, which may be difficult to accomplish on private lands. Future acquisitions should focus on expansion of existing conserved area and forests identified through 'Vermont Conservation Design' and the Forest Legacy Program's Analysis of Need.

FOCUS AREA: FOREST FRAGMENTATION AND PARCELIZATION

Forest fragmentation is a central issue in the 2017 Plan and is tied directly to many of our priority landscapes and focus areas. In 2014, the Vermont General Assembly enacted legislation to assess the current and projected effects of forest fragmentation on Vermont's forest and developed recommendations to protect forest health and integrity.

¹⁶ Landscape, www.landscape.org, 2014.

In April 2015, a comprehensive report, the 2015 Vermont Forest Fragmentation Report (Fragmentation Report)¹⁷, was presented to the Legislature, raising awareness of the issue of forest fragmentation and parcelization in Vermont. In reaction to that report, the 2016 Vermont legislature passed Act 171 that includes new state land use planning goals to manage Vermont's forest lands to maintain and improve forest blocks and habitat connectors. The Act also requires town and regional plans to indicate areas in each town or region deemed important or that require special consideration as forest blocks and habitat connectors, and to plan for land development that minimizes forest fragmentation and promotes the health, viability, and ecological function of forests.

Any land-use change can lead to forest fragmentation. The extent of actual impact depends on the type of change, the degree of fragmentation, and the resource value. It is important to distinguish between a forest fragmented by human infrastructure development and a forest of mixed ages and varied canopy closure that results from good forest management. The former is typically much more damaging to forest health and habitat quality, usually with permanent adverse effects, whereas the latter may only cause a temporary change in forest condition while continuing to support multiple forest benefits.

The effects of fragmentation are well documented. Although related, the impact of fragmentation goes beyond outright loss of forest land. It is about the adverse effects on the smaller fragments of forest that do remain and the changes that occur in their configuration, condition, and connectedness. In general, fragmentation reduces overall forest health and degrades habitat quality, leading to long-term loss of biodiversity, increases in invasive plants, pests, and pathogens, and reduction in water quality. The full range of these effects all stem from two fundamental problems: fragmentation increases isolation between forest communities and increases edge effects within forest fragments.

The Division must work with partners to educate and engage Vermont landowners, municipalities, and land-use decision makers (e.g., realtors and developers) about the economic and ecological benefits of forest blocks and the connectivity among smaller forest blocks to address forest fragmentation in Vermont. We need to continue to invest in land conservation, support existing landowners to keep their land forested, and develop and create markets for Vermont forest products that support working lands and sustainable forestry practices. We also need to develop additional tools for local governments and the state to encourage new growth in existing settlements and near existing roadways. This type of urban development will prevent incursions into high-value forest blocks that converts blocks of forest to other uses.

¹⁷ Vermont Department of Forests, Parks and Recreation, 2015 Vermont Forest Fragmentation Report. April 2015.



GOALS AND STRATEGIES

In the 2017 Plan, we have reexamined and revised the goals and strategies from our 2010 Plan. They are intentionally broad and flexible and will be tied to specific projects and work plans during implementation. Although these goals focus on our DESIRED FUTURE CONDITION: CONSERVE NATIVE BIOLOGICAL DIVERSITY ACROSS ALL LANDSCAPES, they may apply to other Desired Future Conditions.

GOAL 1: MAINTAIN AND ENHANCE A MIX OF FOREST STRUCTURE AND COMPLEXITY ACROSS THE LANDSCAPE.

Strategy 1: Encourage long-term conservation efforts to keep forests forested by supporting programs such as Vermont's UVA, Forest Legacy, Community Forests and Open Space, and Vermont Housing and Conservation Board projects to protect intact forests.

Strategy 2: Encourage adoption of available UVA enrollment options such as Ecologically Significant Treatment Area (ESTA) designation, Significant Wildlife Habitat, and others that support and protect non-timber values of Vermont forests.

Strategy 3: Strengthen collaborative land use planning and policy efforts with partners to conserve forests, developing strategies to reduce or mitigate the rate of forest conversion and reduce forest fragmentation and parcelization at local, statewide, and regional levels.

Strategy 4: Encourage management activities across rural and urban forest landscapes that sustain diverse forest types and tree species, conditions, and age.

GOAL 2: PROTECT, CONSERVE ECOLOGICAL FUNCTION, CONNECT, AND RESTORE LANDSCAPES, HABITATS, NATURAL COMMUNITIES, AND SPECIES OF GREATEST CONSERVATION NEED.

Strategy 5: Identify landscapes, habitats, and species of greatest conservation need, including natural communities and rare, threatened, and endangered species, and monitor trends and indicators.

Strategy 6: Encourage long-term connectivity and protection of landscapes, habitats, and species of greatest conservation need by increasing forest cover in all forested landscapes, especially in high priority forest blocks and in linkage areas between those blocks.

Strategy 7: Encourage management activities and develop conservation plans to protect and restore landscapes; habitats; genetic diversity; rare, threatened, and endangered species; species of greatest conservation need; and other species at risk.

Strategy 8: Work with the Fish & Wildlife Department and regional partners to implement landscape-level management, maintain and enhance ecosystem integrity through programs such as the Staying Connected Initiative, North Atlantic Landscape Conservation Cooperative, and the Wildlife Diversity Program.