

## Working Lands: Strategy

The working landscape is a central component of the character and economy of Lamoille County and has shaped the region's human settlements and transportation networks. This landscape is the result of centuries of active land management by generations of Lamoille County residents. The following key strategies must be recognized:

*Ensure the viability of diverse agricultural and forest-based enterprises* as a key component to maintaining the County's working landscape. Without agriculture and forestry, much of the working landscape would be lost. Agricultural and forest-based enterprises, including agritourism, must be provided with the flexibility to adapt to changing conditions.

*Private property owners are the primary stewards of the County's working landscape.* Private property must be respected, and education is a more effective tool for encouraging sound stewardship of the environment than regulation. As new residents move to the region, it will be important to educate these residents about the Lamoille County land ethic, and the importance of traditional activities, such as agriculture, hunting/fishing, and forestry in order to minimize conflicts over use of land.

*Public Lands contribute to the County's working landscape.* Public lands may range from small, community owned parks to large State Forests. Some towns have invested local resources to create "Town Forests" or operate local Land Trusts. Acquisition of new public land should occur in consultation with the host community, and public lands should be open to diverse public uses.

*Lamoille County is home to diverse wildlife resources, including large blocks of unfragmented core forest habitat.* Wildlife based activities such as hunting and fishing are an important component of the Region's culture and economy. Sound management of the working landscape can enhance these resources, while fragmentation of habitat can undermine its quality.

*The working landscape provides diverse outdoor recreational opportunities,* which also contribute to the regional economy. Recreation includes traditional

activities such as hunting and fishing, as well as newer activities such as mountain biking and dog sledding. With sound land management and cooperative planning, diverse recreational opportunities can coexist with each other and with agriculture and forestry operations.

## **POLICIES & ACTION ITEMS**

**Policy:** *Support and strongly encourage the continued diversification of the agricultural and forest products produced in Lamoille County.*

### **Action Items:**

- Work with communities to ensure that regulations in the Rural and Working Lands Areas (Rural General, Agriculture/Forestry Areas on the Future Land Use Map) allow for diverse farm and forest operations, including onsite value added production, and expanded definitions for State [Required Agricultural Practices](#). Modernize regulations to reflect growth of non-traditional activities (such as agritourism, back-yard saw mills, on-farm cafes, etc.).
- Support expansion of workforce training (adult education and vocational education) efforts related to the agricultural and forestry industries. Examples include the GMTCC Forestry and Land Management Program and the Vermont Woodworking School.

**Policy:** *Encourage development of the secondary industries needed to support the working landscape, such as food processors, saw/lumber mills, storage/warehousing facilities, and incubators (such as the Vermont Food Venture Center).*

### **Action Items:**

- Work with municipalities, LEDC, and other economic development agencies to identify viable uses for the County's lower quality timber, such as siting of a biomass co-generation station, wood pellet manufacturer, or similar facility in the region.

**Policy:** *Support efforts to increase access to local foods and other locally produced agricultural and forest products.*

**Action Items:**

- Work with Regional and State partners to encourage better utilization of local farm and forest products, (such as food, timber, and firewood) at local institutions, schools, resorts, and other major employers.

**Policy:** *This Plan recognizes that much of Lamoille County's working landscape is the result of private property owners acting as stewards of the land. LCPC supports State and local efforts to ensure the viability of the agricultural and forestry industries.*

**Action Items:**

- As Lamoille County's population increases, work with regional and non-profit partners to educate new residents who may not be accustomed to aspects of the working landscape, such as agricultural operations and hunting, and about the economic, cultural, and ecological benefits these activities provide.
- Publicize efforts to promote active land management through resources such as Vermont Fish and Wildlife Landowner/Hunter Access Registry [Landowner - Hunter Connection | Vermont Fish & Wildlife Department](#)
- Increase awareness of the Region's diverse fish and wildlife populations and the Region's importance in sustaining populations of rare, threatened, and endangered species, such as loons and Peregrine falcons.
- Support the protection of unfragmented forest blocks and habitat connectors as wildlife corridors to allow for wildlife migration.
- Support efforts by the Vermont Department of Fish and Wildlife and the Lamoille Fish and Game Club to introduce new residents and the younger generation to traditional outdoor activities such as hunting and fishing.
- Encourage forestry operations that protect unfragmented forest blocks for wildlife corridors and ecological processes and reduce further fragmentation of priority forest blocks.
- Encourage the Current Use Program to allow multiple landowners to combine parcels in order to meet minimum acreage requirements.

**Policy:** *LCPC supports locally initiated efforts to conserve farm and forestland. Once conserved, plans for management of such lands shall be developed in consultation with the host community.*

**Action Items:**

- Support local efforts to create and manage town forests. Encourage efforts that include outreach to private landowners regarding sound forest management techniques and operations in accordance with [Acceptable Management Practices](#).
- Support municipalities and local landowners in the conservation and protection of priority forest blocks and habitat connectors on conserved farm and forestland.

**Policy:** *Whenever a State or Federal agency considers a new land acquisition, it shall consult with the local legislative body prior to making any purchase.*

**Action Items:**

- Engage any public entity considering a new land acquisition in Lamoille County early in the process to ensure local concerns are addressed.

**Policy:** *Given the large amount of State-owned land within Lamoille County, public use of this land for recreation, wildlife management (including hunting), timber management, and maple sugar production should be allowed and encouraged.*

**Action Items:**

- Work with the Vermont Department of Forests, Parks, and Recreation to determine if areas of State Forest land within the County should be open to maple sugar production. Only areas that would not degrade recreational use or ecological integrity of the forest should be considered. If such areas are present, the Department should consider piloting a test program allowing maple sugar production on State Forest land in Lamoille County.
- Explore opportunities for use of State lands for renewable energy development with consideration given to wildlife, watersheds, scenic resources, carbon sequestration, and other potential impacts.

**Policy:** *This Plan recognizes the value of the County's forestland in providing recreational opportunities and the important role that all forms of outdoor recreation play in the Region's economy.*

**Policy:** *Regionally significant ridgelines, such as Mount Elmore and the Worcester Range, Mount Mansfield and the Sterling Range, the Woodbury Range, Butternut Mountain, and Belvidere Mountain, should be protected from major development.*

**Policy:** *Fragmentation of core forest areas and other important wildlife habitat is strongly discouraged.*

**Action Items:**

- To prevent undue fragmentation of farm and forestland, work with communities to investigate innovative tools for maintaining the working landscape. Tools include alternatives to traditional “large lot zoning” such as density averaging and Planned Unit Developments, density transfers/transfer of development rights, and overlay districts.
- Work with federal, state, regional, and municipal partners to promote the protection of high priority forest blocks and habitat connectors to support biodiversity and allow for the movement of wildlife.
- Work with communities to explore forestry operations that improve forest health and maintain wildlife habitat, including: pruning; planting; reforestation; pest, disease, and invasive species control; fertilization; and timber harvest.
- Work with forestry and conservation partners to explore funding opportunities to protect priority forest blocks and wildlife habitat connectors. This may include funding to purchase, conserve, or maintain priority forest blocks for critical wildlife habitat, wildlife migration, and recreation.

**Policy:** *State transportation and infrastructure projects shall consider impacts on wildlife connectivity.*

**Action Items:**

- Work with municipalities to obtain funds to improve wildlife passage through the transportation network.

## Working Lands: Background and Inventory

Lamoille County's topography has shaped the region's landscape, human settlements, and transportation networks. The County is bounded to the west by the Green Mountains, including Mount Mansfield, Vermont's highest peak, and to the east by the Worcester Range. These ranges provide the visual backdrop for which the County is known. Much of the higher elevations are largely undeveloped and contain large swaths of unfragmented forestland and wildlife habitat that are critical to the movement and survival of many species of animals. The summit and surrounding area of Mount Mansfield contain the highest concentration of fragile areas in the County.

In some cases, the underlying geography of these areas is rare itself. For example, the cliffs of Smugglers' Notch contain one of only 11 documented examples in Vermont of a Cold Calcareous Cliff Community. This community type is characterized by large exposures of moderately base-rich bedrock, usually at high elevations, with frequent natural disturbances such as ice fall and rock fall. These cliffs also constitute one of only a few active Peregrine falcon nesting sites in the State of Vermont.

The mountain summits and ridgelines also provide the headwaters for streams flowing into the Lamoille River. As these streams run down the mountains, they form numerous waterfalls, cascades, and gorges that are themselves important features of the County's landscape. These features create an attractive recreational resource. They also provide an important educational resource by illustrating the geologic history of the region and offer specialized habitats and microclimates for many species of flora and fauna. Lamoille County is home to twelve hydrogeological features as documented in *Waterfalls, Cascades, and Gorges in Lamoille County* (December 1991) prepared by the Lamoille County Planning Commission. This report evaluated these sites for their potential for loss due to landowner attitudes towards access, adjacent land uses and development, and overuse. The report concluded that, while many of these features are protected by public ownership or land use regulations, communities should recognize the valuable public benefit the private property owners are providing by keeping access open. Efforts should be considered for public or semi-public acquisition where possible.

The biophysical regions of Vermont characterize the landscape into distinct units that share features of climate, geology, topography, soils, natural communities, and human history. Although each region has variation within it, all are widely recognized as units that are more similar than they are different. 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 are characterized by high elevations, cool summer temperatures, and acidic metamorphic rocks. The characteristic natural communities include Northern Hardwood Forests and the high elevation communities of the Spruce-Fir Northern Hardwood Forest. The Green Mountain range has a marked influence on the climate of the region, with temperatures in higher elevations typically cooler than at lower elevations and with higher elevations receiving significantly more precipitation than low lying areas.<sup>1</sup>

The Northern Green Mountains today are comprised of primarily metamorphic rocks, mainly schist, phyllites, gneisses, and quartzite. These rock types are generally acidic. Glaciation has influenced the surface geology and topography of the region. Smugglers' Notch is an old stream valley that was significantly enlarged by the passing glaciers. Except for the higher elevations of the Northern Green Mountains where there are extensive areas of exposed bedrock, much of the biophysical region is covered with glacial till<sup>2</sup>.

The highest elevation peaks in Vermont are found in the Northern Green Mountains. 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 Ranges. The Worcester Mountains include Elmore Mountain and Mount Hunger and are separated from the main range by the Stowe Valley. The Lowell Mountains extend from near Lake Memphremagog southwest to Eden. The Cold Hollow Range begins just north of Route 109 in Belvidere and extends into Franklin County. The Sterling Range lies just east of

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<sup>1</sup> Thompson E. and Sorenson E. (2005) *Wetland, Woodland, Wildland; A Guide to the Natural Communities Of Vermont.*

<sup>2</sup> *ibid*

Route 108 and south of the Lamoille River Valley. Bisecting the Green Mountains, the Lamoille River valley provides topographic diversity in the region. Because of its generally steeply sloping topography, the Northern Green Mountain region has no natural lakes and substantially fewer wetlands than other parts of the state.

This rough topography has shaped human settlement patterns and the economy of the region. Traditionally, villages and downtowns were located at key routes along the rivers, roads, and railroads cut into the lowland river valleys. The narrow river valleys have provided opportunities for agriculture, but not nearly at the scale possible in the wider Champlain Valley. After rapid deforestation in the early 1800s, forests returned to the County's steep hillsides and eventually became an important component of the region's economy. Finally, the hills themselves became valuable for the mineral resources beneath them. All of these economic forces shaped the landscape of Lamoille County. Thus, while Lamoille County is rich in natural resources, it must be remembered that the County is not an "unspoiled wilderness" but rather a working landscape shaped, for better or worse, by current and past generations.

## Agriculture

### **The Changing Face of Agriculture**

While only 17% of land in Lamoille County is actively used for agriculture, farming continues to play an important role in shaping the economy and character of the County. Most of the agricultural activities in the County occur in the Lamoille River Valley and its primary tributary basins – where the land is level, tillable, and productive. Aside from providing locally produced farm products and employment, agriculture is a critical part of the Vermont way of life and contributes to the County's traditional settlement pattern by providing a diversity of land uses and open space that is characteristic of northern Vermont.

According to the 2017 USDA Census the market value of products sold was \$84,319. The total market value of products sold in Lamoille County was \$27.74 million. A thorough analysis could be conducted in the future to fully evaluate how Lamoille County agriculture compares to its neighbors; Caledonia County farm sales to the east average \$72,076 while Orleans County farms to the north

average \$164,875. Washington County farms average about \$55,565 of sales. To the northwest, Franklin County farms average \$254,614 worth of sales.

The face of agriculture in Lamoille County is currently in a state of change. Traditionally, dairy farming was the predominant type of agriculture within the County. While dairy remains an important component of the County’s agricultural industry, it is not as dominant as it once was. Of the \$27.74 million worth of agricultural products sold by Lamoille County farms, more than fifty percent is from milk and other dairy products.

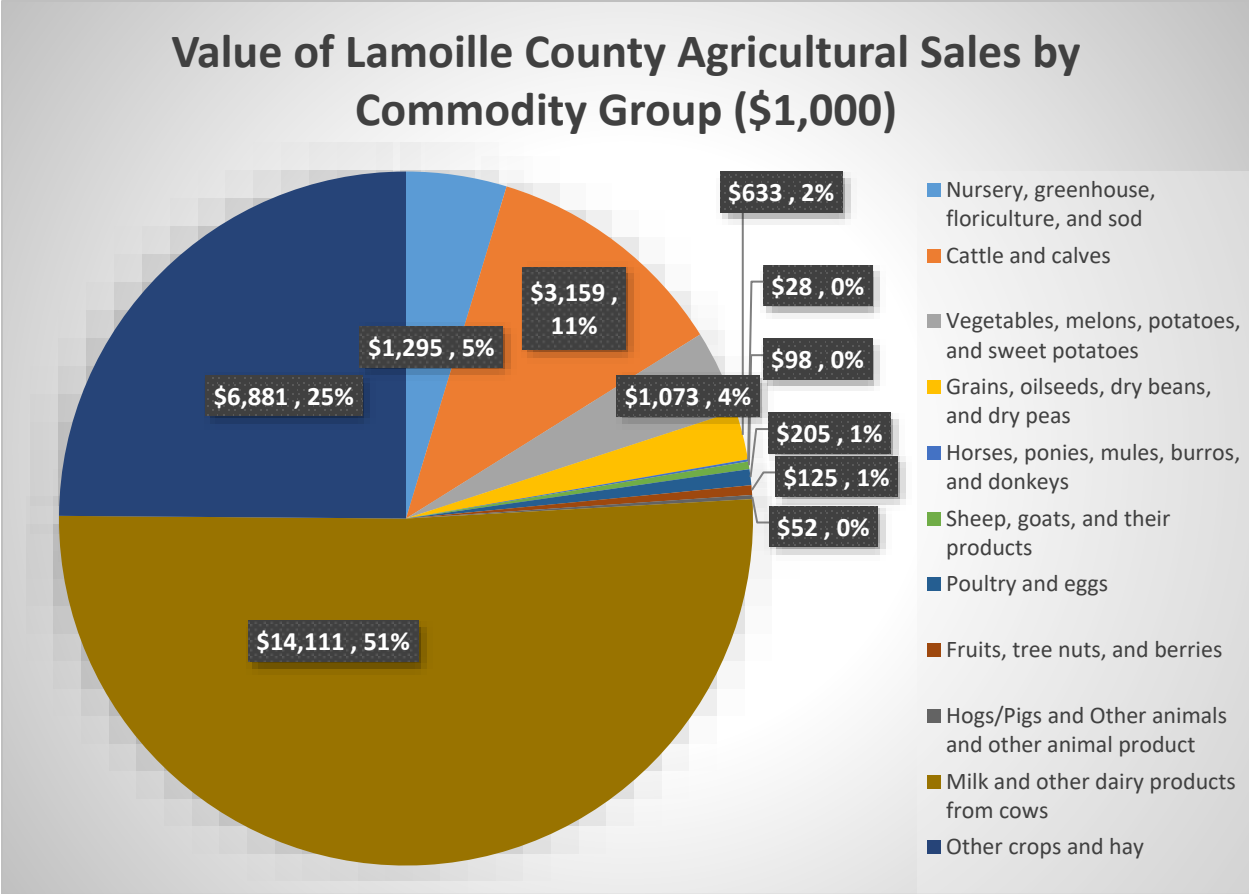


Figure 4-2. Value of Lamoille County Agricultural Sales by Commodity Group (\$1,000)  
 Source: USDA Census of Agriculture, 2017

The number of dairy farms decreased according to the USDA, falling to 24 dairy farms. This apparent decrease has led to the emergence of new agricultural products and has led some to say that Vermont is experiencing an “Agricultural Renaissance.” New agricultural products being produced in Lamoille County include organic produce, wine, organic beef, seed, saffron, marijuana, nursery

production, and specialty products such as cheese and bread. This trend can be seen in the growing variety of commodities represented in the graph above. Many of these new agricultural enterprises rely on “direct marketing” of products to the consumer while traditionally farmers sold a commodity (such as bulk milk) to a producer who then processed the product for sale to the consumer. Under direct marketing, the farmer sells a product, either raw or processed, to the consumer.

### **Agritourism**

Visiting an agricultural enterprise to enjoy, be educated, or participate in, an activity has taken on a life of its own in Vermont, known as agritourism. Agricultural operations in Lamoille County have diversified their offerings, hosting farm-to-table dinners and special events, adding special events barns, hosting corn mazes, and providing opportunities to enjoy the scenery and inner workings of an active farm. These activities allow agricultural operations to earn new income and cater to larger audiences of visitors to the region. Agritourism is not without its challenges. Many of these activities do not qualify for state or local “Agricultural Exemptions”, and some local zoning codes may unintentionally restrict agritourism related activities in rural areas.

### **What is a Farm?**

The U.S. Census defines a farm as any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. Products include crops such as cash grains, field crops, vegetables, fruits and tree nuts, horticultural specialties, and livestock such as beef cattle, hogs, sheep, goats, dairy cattle, poultry, eggs, animal specialties, and general livestock. Note that this definition does not necessarily account for small agricultural operations or value-added operations that are becoming more common in the County. Farming operations in Vermont are regulated in accordance with the Required Agricultural Practices (RAPs). These practices set standards to which all types of farms must be managed to reduce the impact of agricultural activities to water quality. For more information on RAPs visit <https://agriculture.vermont.gov/rap>.

Nationally, the number of large farms is growing while the number of small farms is also increasing. These smaller farms are becoming more diversified, thus

representing agricultural-related operations rather than specializing in one area, i.e., a dairy farm. Agri-related operations which include aquaculture, apiary, value-added processing (such as cheese operations), and crop diversification are redefining agriculture in Vermont and Lamoille County.

Table 4-1. Number and Average Size of Farms, 1910- 2012

Year	Number of farms (Lamoille County)	Average land in farm – Lamoille County (acres)	Number of farms (Vermont)
2017	329	162	6,808
2012	349	149	7,338
2007	300	166	6,984
2002	317	170	6,571
1997	297	165	5,828
1992	227	182	5,436
1987	213	211	5,877
1982	255	231	6,315
1978	244	230	7,273
1974	248	223	5,906
1969	312	223	6,874
1964	443	246	9,247
1959	586	219	12,099
1954	826	189	n/a
1950	954	170	n/a
1945	1223	143	n/a
1940	1195	135	n/a
1935	1316	136	n/a
1930	1424	141	n/a
1925	1459	129	n/a
1920	1599	129	n/a
1910	1629	129	n/a

Source: USDA Census of Agriculture 2007, 2012, 2017

### Number and size of Farms

The USDA conducts a Census of Agriculture every five years. The most recent Census in 2017 counted 329 farms in Lamoille County. This is a 6% decrease from 2012. There was a slight increase in the number of farms in the County between 1987 and 1992 and again between 1997 and 2002, but there is no consistent pattern.

Based on historical data collected through the Census of Agriculture, the average size of a Lamoille County farm has fluctuated over time. The average size of Lamoille County farms decreased over the fifteen-year period between 1978 and 1992 from 230 acres to 182 acres. Today, the average size of farms is 162 acres. Note that the land in these reports is based on ownership and does not include leased-land farming activities (Table 4-1).

Farming trends can be evaluated by examining the amount of land used for agriculture over time. This number has also been fluctuating. In 2017, agricultural land in Lamoille County amounted to 53,155 acres, an increase compared to 2012. This increase does not follow the statewide trend. (Figure 4-3).

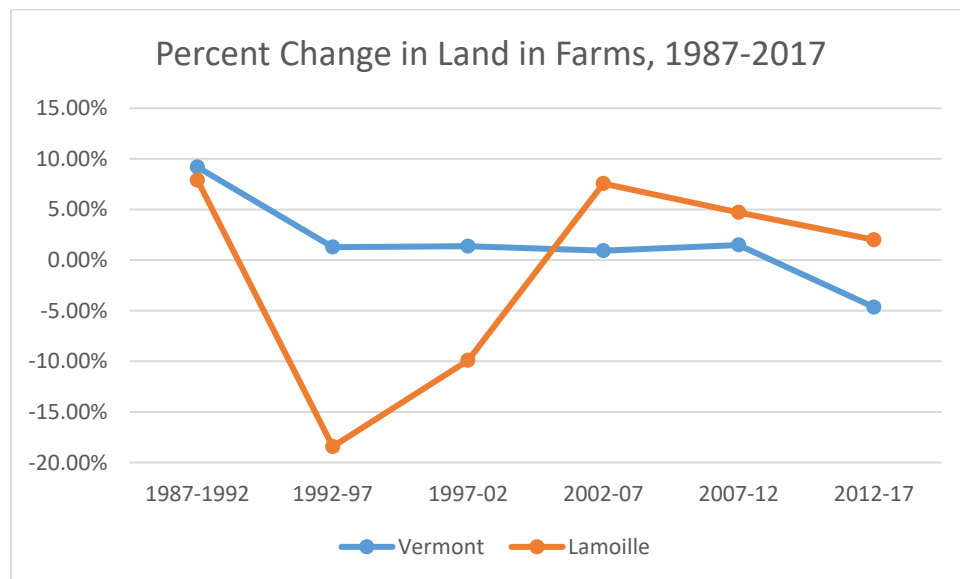


Figure 4-3. Percent Change in Land in Farms, 1987-2017

### The Challenging Demographics of Farming

According to the 2017 USDA Census, the average age of a farmer in Lamoille County was 52.7, which is younger than the State average of 55.9 years old. In Lamoille County, less than half of the principal operators of farms count farming as their primary occupation, meaning many farmers are working off-farm at another job.

Given the average age of farmers in Lamoille County, one of the major challenges facing the future of agriculture is finding new, young farmers to continue the industry once the current generation retires. The cost of land and equipment can be insurmountable for many young farmers. “Vermont Land Link,” operated by

the Lamoille Economic Development Corporation, represents one tool for addressing these challenges. This tool connects farmers with landowners interested in leasing their land. The Vermont Land Trust Farmland Access Program also provides a mechanism for beginning farmers to purchase land at more affordable prices.

### **Support Industries**

In addition to farm enterprises themselves, a vibrant agricultural economy relies on the availability of appropriate infrastructure, including roads, utilities, processing, and storage capacity. Notable gaps in the existing support infrastructure include: the need for additional meat processing and cold storage capacity; the need for facilities for processing and packaging of fresh vegetables, eggs, and other produce; and the lack of facilities for milling and processing wood products. Unless these gaps are addressed, Lamoille County's farm and forest economy will be unable to reach its full potential.

### **Agricultural Soils**

According to the USDA Natural Resource Conservation Service, Lamoille County contains 19,727 acres (6.5%) of prime agricultural soil and 61,908 acres (20.4%) of potentially good (Statewide Importance) agricultural soils. These soils are primarily found along the Lamoille River and its tributaries. These prime agricultural soils come under the scrutiny of Vermont's Land Use and Development Law, Act 250, which considers the productivity of agricultural land when large developments are proposed. Under this Statute, when a development subject to Act 250 impacts agricultural soils, mitigation of these soils is required. In general, Act 250 is structured to prefer "on-site" mitigation – that is, modifying the site design of the project so that the soils are not impacted (see §6093(a)(2)). However, the District Commission may authorize "off-site" mitigation if "that action is deemed consistent with the agricultural elements of local and regional plans" (see 10 VSA §6093(a)(3)(b)). Specific policies related to mitigation of agricultural soils and other natural resources are found in the Land Use Section of this Plan.

### **Forestry**

Today, forests are the dominant land cover in Lamoille County. The County's forests provide a wide range of services which support the region economically,

environmentally, and socially. Forests provide economic benefits such as jobs in the woods and the mills and physical products such as lumber. Habitats for numerous game and non-game woodland animals and protection of valuable water resources are among the ecological benefits of the County's forests. Finally, forests provide quality of life factors impossible to quantify, such as hunting, recreation, clean, cool air, and aesthetic pleasure.

The region's forest resources provide an important component to the region's economy. Without some economic benefit being derived from forestland, it is difficult to imagine landowners keeping their resource lands in production. Many would argue it is the working forest that provides the greatest diversity of benefits to the landowner and public alike. With few exceptions, a healthy working forest provides a diversity of habitats for woodland animals, trails for recreationalists, and a blanket of color on our mountains and ridgelines for both residents and visitors.

Approximately 80% of Lamoille County is forested (covered in forest) – totaling nearly 240,000 acres. 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. According to the U.S. Forest Service, 235,500 acres (98.5%) of the region's forest is categorized as timberland-forestland producing, or capable of producing, crops of industrial wood (>20 cubic ft./ac./year) and not withdrawn from timber utilization. Most of the timberland in the County is dominated by maple, beech, and birch, with spruce-fir occurring mostly at higher elevations. A majority of both the acres and volume of the region's timberland are of sufficient size and quality to be considered saw timber. Sugar maple, yellow birch, beech, and red spruce represent the most abundant species in this size-class.

Despite these characteristics, much of Lamoille County's forests are not currently commercially viable for timber management due to the health and quality of the growing stock and current market forces. According to surveys by 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% of northern

Vermont's growing stock being of such poor quality that it is of little or no commercial value (live culls). This, in combination with irregular markets for wood chips, places further demand on the high-quality stems, as landowners and managers need to generate a return from the land. What is needed, according to some forest economists, is a large reduction in the standing volume of both live culls and thinning over-stocked stands, along with management and harvesting practices that encourage the regeneration of native species to improve overall forest quality and economic value.

Old-growth forests serve as a reservoir for plant and animal species, which when logged can result in issues evident in young forests. Old-growth forests have unique ecological characteristics such as diverse tree structures that allow for diverse wildlife habitat. These areas have not been logged and may be referred to as virgin forests.

### **Timber and Wood Products Manufacturing**

Forests are a source of raw materials which support traditional forest products industries, such as hardwood veneer, lumber, pulpwood, fuel wood, and chipwood. In 2019, 0.84% of the State's hardwood harvest was derived from Lamoille County, making it the second highest contributing county in the State. Most of the large-scale harvesting occurs in the upland forest areas of the region as these areas are characterized by high quality soils and relatively easy access. For example, the Atlas Timberlands consist of approximately 26,789 acres of upland forest that have been actively managed and harvested for at least a century.

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 can 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. Total harvest declined over the last decade in Lamoille County and the state as a whole (Figure 4-4).

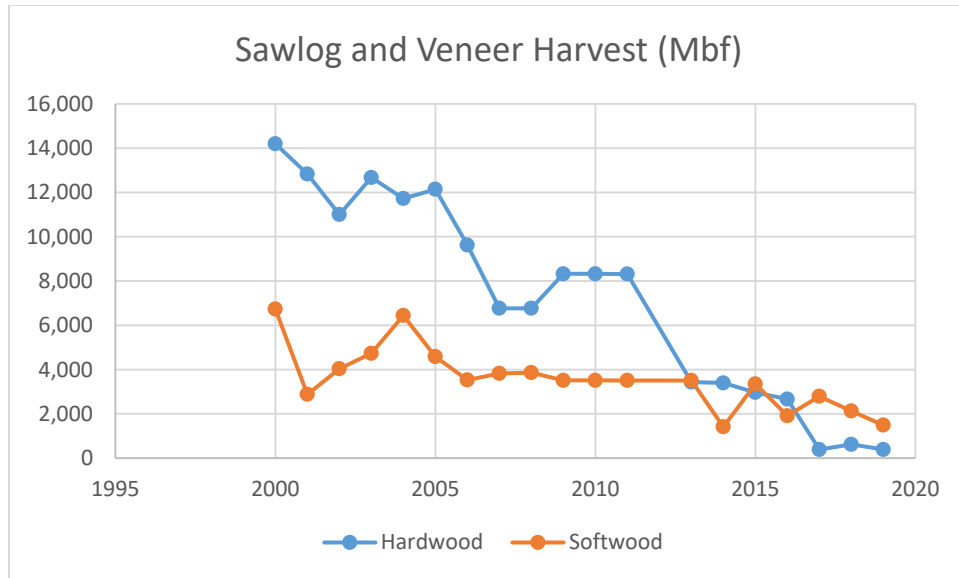


Figure 4-4: Sawlog and Veneer Harvest (Mbf)

The number of sawmills (both active and dormant) has also decreased, reflecting the lower harvest figures. The past decade has been characterized by significant economic challenges to the Vermont sawmill industry, and with only one operating sawmill in the region, Lamoille County has not been immune to such challenges. The decline of the housing market, the recent recession, and the subsequent decline of construction is further compounding this challenge. An inadequate number of sawmills throughout the region undermines quality forest management and forest diversity. As the number of sawmills declines, the increased transportation distance saw logs must travel to a mill increases the cost of production and harvesting which in turn results in a decreased profit margin on marginal species and grades. This trend significantly reduces the economic incentive for landowners to actively manage forests and can contribute to the conversion of forest land to other uses. Currently, due to the lack of adequate local processing facilities as well as the overall lack of production volume, most of the region’s hardwood is filtered into established major supply routes throughout the Northeast. Much of the local hardwood is transported via Interstate 91 to Canadian sawmills for production. As the number of sawmills declines, there is a point where the number becomes too small to adequately support a diverse market.<sup>3</sup>

<sup>3</sup> Vermont Department of Forests, Parks and Recreation (2011). 2010 *Vermont Forest Resources Plan* Division of Forests  
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Quarterly Workforce Indicators (QWI) from the Census provide an indicator for Vermont's forest industry based on employment and salaries. The QWI counts jobs, rather than employed workers, and does not include self-employed workers and independent contractor employment. The QWI statistics for Lamoille County for the categories Forestry and Logging and Associated Forestry are largely missing, possibly due to the fact that the vast majority of forest workers in the County are self-employed. Employment statistics for the wood products manufacturing industry as a proxy for forestry related employment is not available for Lamoille County.

There is 1 operational sawmill in Lamoille County. While it may be increasingly difficult to operate an economically viable, traditional sawmill, as with agriculture, diversification may represent an opportunity to maintain the forest products industry in Lamoille County. Small "backyard" mills, portable mills, firewood suppliers, and cottage furniture makers and wood turners all represent potential opportunities to create local employment while adding value to raw timber materials produced in Lamoille County. Timber harvesting activities shall comply with the Vermont Acceptable Management Practices (AMPs) to ensure sustainable harvest practices. For information on the Acceptable Management Practices visit <https://fpr.vermont.gov/forests/watershed-forestry/acceptable-management-practices>.

### **Maple Products**

While timber harvesting and the wood products industry appear to be in decline, the use of Lamoille County's forests for maple products is growing. Lamoille County has witnessed a significant expansion within the maple products industry over the past decade, characterized by the growth of existing small and medium scale maple sugaring operations as well as the addition of new operations. Both the number of taps and the total amount of syrup produced in Lamoille County have increased over the last decade (town level data is not available). Lamoille County is still the second highest maple syrup producer of any Vermont county (Figures 4-5 and 4-6). Lamoille County is home to one of the State's largest producers of maple products with merchandise exported worldwide. Through the Lamoille County Planning Commission's 2011 Forest Stewardship Project, several consulting foresters reported that land previously managed for timber production is now being managed for maple syrup

production.

A large portion of Lamoille County’s forestland is located within a State Forest. Under current State policy, land within a State Forest cannot be used for maple syrup production. In the past, syrup production and timber harvesting have been viewed as conflicting management goals. Traditional sawmills operated on volume and remained profitable by “keeping the saws running.” As a result, trees that had been tapped for sugaring were considered unusable as tap holes contained imperfections and made the lower 5-6 feet of a tree un-millable. This may not be the case for more modern, precision mills that produce more specialized products.

Today, there may be a niche market for furniture and turned wood that contains evidence of tap holes. Given the growth of maple syrup production in the region and changes in the timber industry, the County could consider working with the Department of Forest, Parks, and Recreation to begin a test project of maple production on State land.

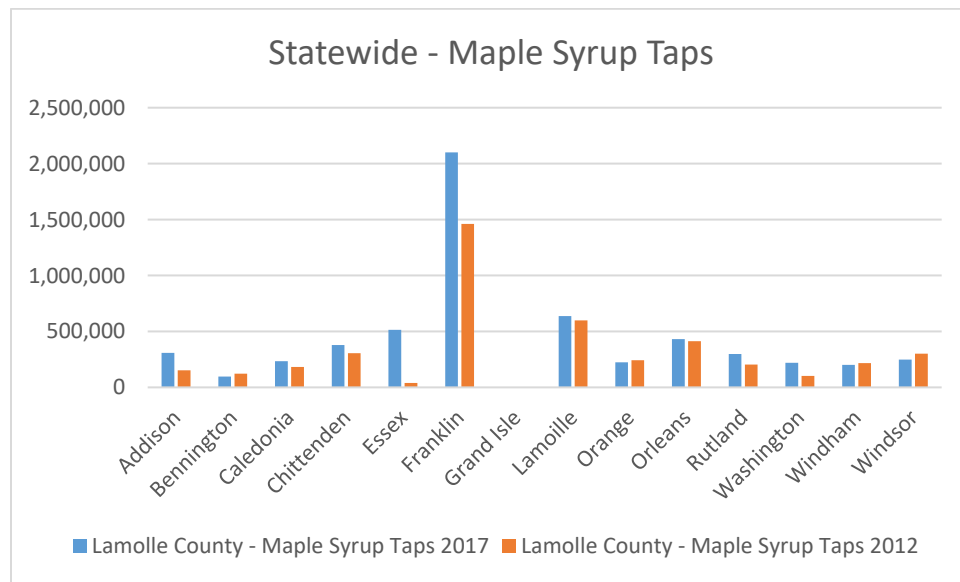


Figure 4-5 Vermont Maple Taps by County 2012-2017

Source: 2017 USDA Census

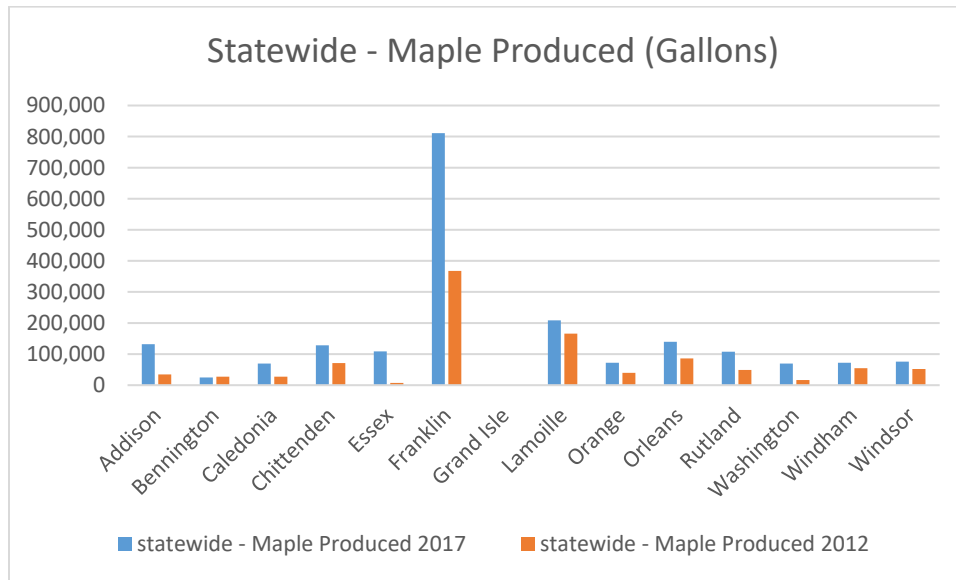


Figure 4-6. Vermont Maple Syrup Production by County  
Source: 2017 USDA Census

### Wood for Energy

In addition to timber, wood is also harvested for energy. In the past there has been an overall increase in demand for wood energy, recognized at both the commercial and institutional level. The Department of Forests, Parks, and Recreation has a practical guide for schools and affordable housing units to utilize when considering modern wood heating. Personal consumer demand has remained strong with over 38% of Vermont homes heated in full or partly by wood. The wood burning systems have become much more efficient and cleaner. Use of wood for energy represents an opportunity to continue to manage Lamoille County’s forests despite the poor timber market and lower quality growing stock, as some wood that may not be suitable for timber may be suitable for wood chips, wood pellets, or cordwood.

It should be noted that cordwood is a major medium by which invasive species spread. As a result, the Vermont Agency of Natural Resources recommends that firewood not be transported more than 50 miles from where it originates. Currently, Lamoille County’s forests are relatively free of many invasive insects. It is important to understand that Emerald Ash Borer is beginning to become a concern for the county, an invasive species that could be spread by moving cordwood from infested areas. Better marketing of locally cut cordwood to

County residents, as well as visitors to the numerous area parks and resorts, could increase opportunities for local businesses and forestland owners, while also preventing the spread of unwanted pests.

### **Other Forest Products**

While the term “forest products” is often used synonymously with “wood products,” a wide variety of non-timber forest resources could be derived from the County’s forests. As noted earlier, due to past practices of high grading, much of Lamoille County’s existing forests contain timber that is of low commercial value. Since management of a forest for non-timber products often requires less acreage than management of a forest for timber, these products may represent an opportunity to adapt to the challenges related to parcelization. New opportunities for forest landowners that create an economic incentive to manage and maintain woodlands within the County may include the following non-timber forest products:

- Fiddleheads were once primarily foraged and consumed on a personal level. There is a growing demand at specialty restaurants and grocery stores for fiddleheads which grow well in forested riparian and wetland areas.
- Shiitake mushrooms, often grown in newly cut beech trees, could improve the health of those stands as well as associated black bear habitat. As Lamoille County’s climate warms, other commercially grown mushrooms, such as Morels, Chanterelles, and Black Trumpets, may be grown in the County’s forests. Due to climatic reasons, Vermont restaurants currently import most of their supplies of these high-priced delicacies from the Pacific Northwest.
- Spruce tips were once a traditional ingredient in ale. Several Vermont based brewers, including Rock Art Brewery in Morristown, now produce beers flavored with spruce tips. Spruce tips can be used for a variety of culinary uses.
- In the past, Lamoille County’s forests supplied several commercial stills which produced cedar and pine oil. These products were wholesaled to national manufacturers. New, smaller scale producers may be able to develop niche markets for Vermont “brand” oils or for incorporation into other Vermont value added products.
  - Medicinal and herbal products such as ginseng and golden seal.

- Decorative products, including holiday greenery and vines.
- Edible wild products such as ramps, fruits, and various nuts.
- Specialty products such as brown ash used for basketry.

### **Ecological Benefits of Forests – Air Quality**

Overall, within Lamoille County local air quality concerns are primarily related to emissions from traffic, heating systems (e.g. woodstoves), and some agricultural practices. Lamoille County occasionally experiences “bad air days” in which air quality standards are exceeded during the winter months as a result of “cold air” inversion. This is the process by which dense, cold air traps pollutants close to the ground surface. It is important to note that as of this writing, neighboring Chittenden County is at risk for non-attainment status due to the amount of particulate matter and ground-level ozone present. The cumulative effect of these sources may increase with additional growth and may have greater impacts on local air quality. Tree and forest canopies can have a significant positive impact on 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. Maintaining Lamoille County’s working forests is thus essential to maintaining 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. For example, 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 Mansfield.

### **Ecological Benefits of Forests – Water Quality and Flood Water Attenuation**

Forest cover plays a significant role in the maintenance of water quality and quantity. Upland forests contain the majority of the Class A headwaters in the region as well as many larger streams that include fisheries, waterfalls, swimming holes, and other recreational and scenic resources. Upland forests retain and filter groundwater, an essential resource in a county where many residents draw their water from private or community wells. In addition, forest cover helps to regulate water temperatures. This is extremely important for fish species, such as trout, which rely on cool oxygen rich environments.

While much attention is given to the role of floodplains, which are primarily located on the valley floor, upland forests also play a critical role in reducing flooding and erosion hazards. Forested land attenuates water much more effectively than cleared land. This is especially important on steep slopes with erodible soil. Maintaining upland forest landscapes ultimately reduces the amount of water entering the floodplain and provides protection for human settlements along the County's water courses.

#### Fish, Game, and Other Wildlife

[A new report by the U.S. Department of Commerce's Bureau of Economic Analysis](#) finds that Vermont is fourth among states when measured by contribution of outdoor recreation to Gross Domestic Product. Hunters alone spend more than \$292 million in Vermont annually according to the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation conducted by the U.S. Fish and Wildlife Service and the U.S. Census Bureau. About \$190 million is spent on equipment, more than \$39 million is trip-related, and more than \$162 million is spent on other items. As discussed below, Lamoille County contains extensive and diverse wildlife habitat, making it an attractive location for hunting. Similarly, the County's ponds and rivers are attractive areas for people interested in fishing, bird watching, swimming, and other water-based recreational activities.

The figures below (4-7,4-8) reflect harvest data for four "big game" species tracked by the Vermont Department of Fish and Wildlife (deer, wild turkey, black bear, and moose). The annual harvest is showing an upward trend for each of these species with the notable exception of Moose. While the figures below are aggregate harvest data on the County level, town level data is also available. Based on this data, Belvidere and Eden had the highest harvests in the County in the last ten years. This data illustrates why two state roads through Eden and Elmore (Route 118 and Route 12) are referred to locally as "Moose Alley". The Forest Ecological Resources map (below) records animal/automobile collisions and confirms the large number of moose crossing these roads.

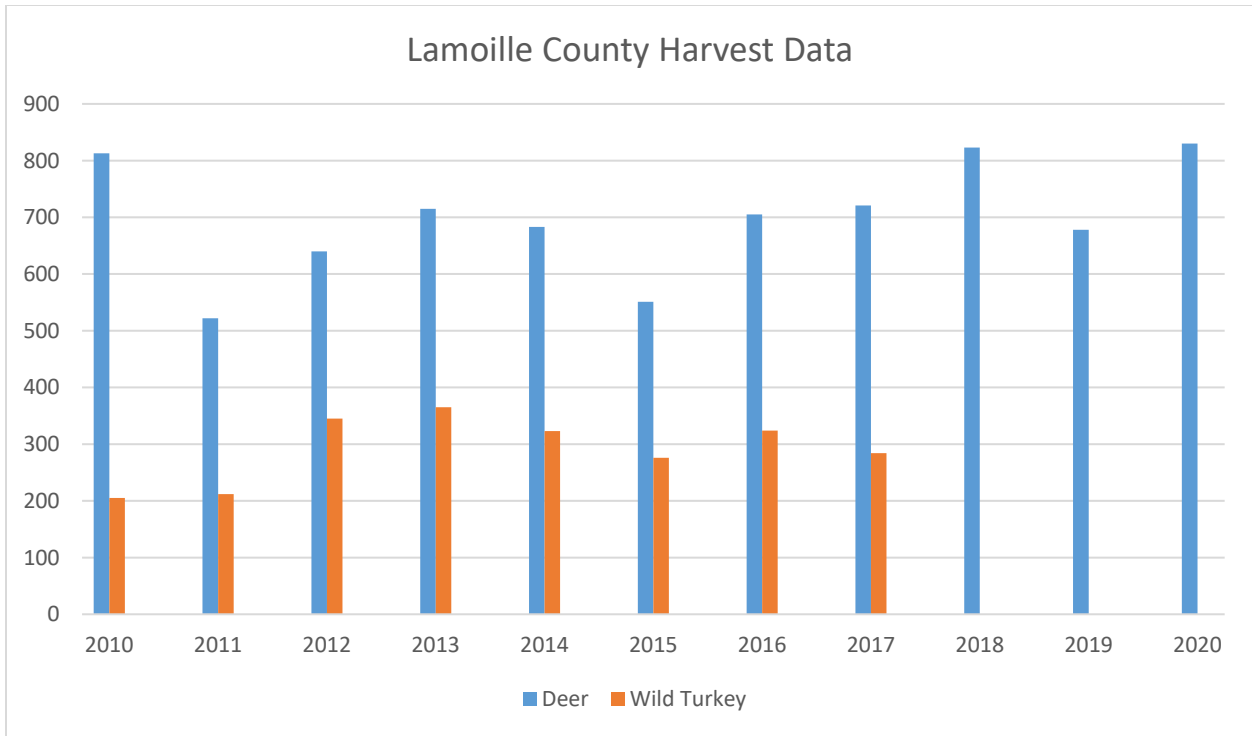


Figure 4-7 Lamoille County Harvest Data

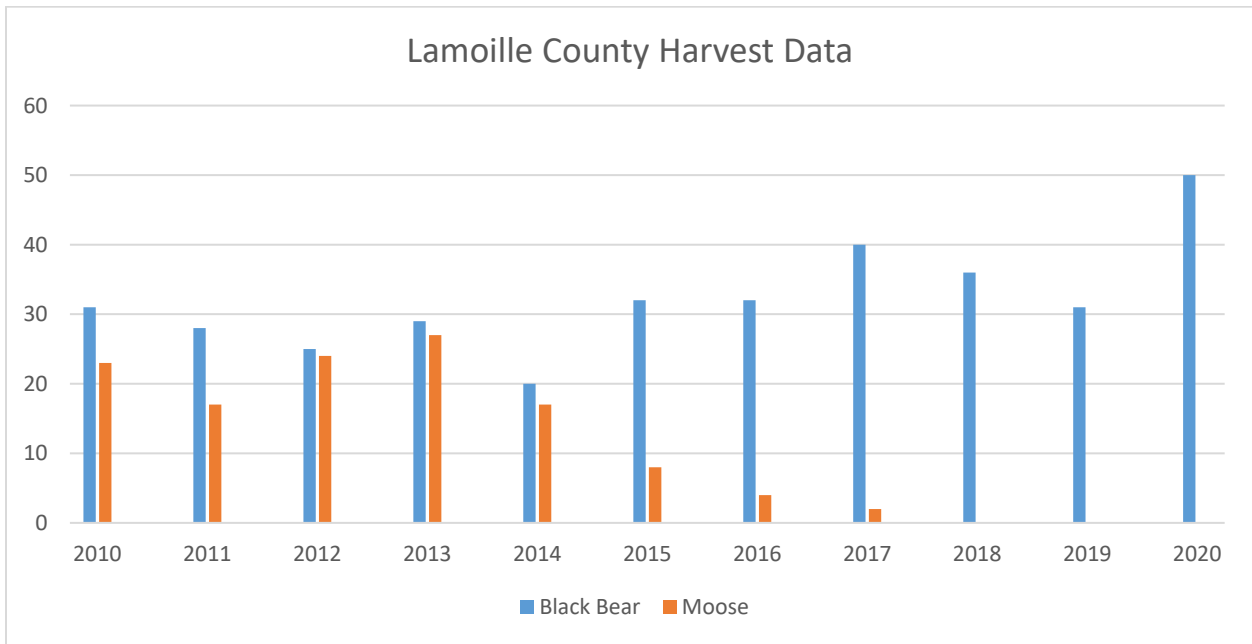
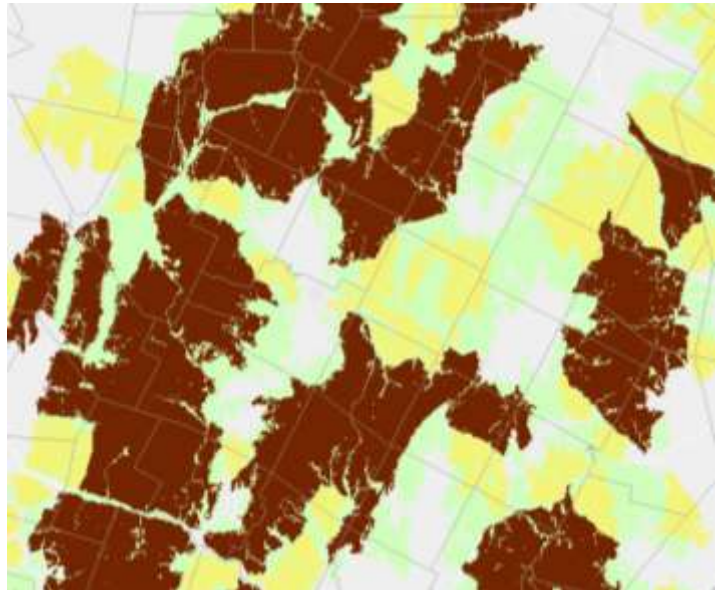


Fig. 4-8 Lamoille County Harvest Data

## Core Habitat

Core Habitat refers to large blocks of unfragmented forestland. These areas provide important mating, nesting, feeding, and denning habitats for species that cannot survive in close proximity to human habitation. Species that rely on such areas include hawks, owls, songbirds, fisher, moose, bobcat, and black bear. Mammals such as deer, moose, bear, bobcat, fisher, and coyote may require very large contiguous forest acreage of up to 600 to 7,500 acres.



The Vermont Department of Fish and Wildlife Divides Core Habitat into two distinct areas, represented below:

- **Anchor Blocks**, or blocks of unfragmented forestland greater than 10,000 acres in size. Anchor blocks provide large blocks of contiguous critical habitat for species such as black bears, spotted salamanders, moose, and barred owls. These are the primary homes for many animals. Anchor blocks are the dark brown areas identified in the graphic above. These areas are found primarily at the outer edge of Lamoille County, in Belvidere, Eden, Elmore, Stowe, Cambridge, and Waterville.
- **Connecting Blocks**, or blocks of unfragmented forestland between 2,000 acres and 10,000 acres. Connecting blocks provide critical habitat for species because they have good forest cover but are not necessarily large enough to maintain populations of wide-ranging species. Connecting blocks are identified in the graphic above as the yellow areas. These areas are at the edge of the anchor blocks.

Fragmentation of large forest blocks through subdivision and development diminishes the ability of wildlife to access core habitat functions. Fragmentation (the process of dividing large, contiguous blocks of habitat into isolated patches) produces less attractive wildlife habitat than contiguous forestland. As a result, wildlife species can change from aesthetically pleasing and recreationally

important (deer, moose, bear, bobcat, otter) to less attractive, often undesirable, nuisance species (pigeons, sparrows, starlings, rats, skunks). In addition, as larger blocks of forestland are divided into subdivisions, less land is available for hunting and other traditional activities. The largest blocks of unfragmented Core Habitat in Lamoille County are generally found along the region's ridgelines and mountainous areas.

To assure a high likelihood of native wildlife species, contiguous blocks of habitat should be connected through wildlife corridors. These areas are sometimes referred to as connecting lands (see the green areas above). Connecting lands include unfragmented blocks of forestland less than 2,000 acres in size. These might include individual road sections where wildlife is likely to cross. Wildlife corridors provide for both seasonal and special needs of different species. For example, a wildlife corridor may connect habitat blocks that allow black bears to access important food resources during different seasons of the year (seasonal), or it may prevent isolation of bear populations by allowing free exchange of breeding adults (spatial). Ultimately, wildlife corridors help to ensure that the habitat, movement, migration, and behavior requirements of most native plants and animals are available across a broad landscape. The broader ecological value of connecting habitat is to join fragmented pieces of habitat, thereby reducing the deleterious effects of habitat fragmentation and population isolation.

Maintaining, improving, and protecting wildlife corridors and connecting lands also aligns with Act 171. In 2016, Act 171 was passed in Vermont to encourage and address protection of high priority forest blocks and habitat connectors, while supporting the local forestry industry. In addition to forest blocks, riparian habitat along rivers and streams, strips of forest cover between developed areas, and even hedgerows and fencerows, all represent potential connecting habitat. Coordinated planning for and active management of wildlife corridors is critical to allowing the movement, migration, and dispersal of animals and plants as well as the functioning of ecological processes. Municipalities are encouraged under Act 171 to prevent forest fragmentation and protect wildlife corridors. For more information, please refer to the Act 171 guidance document on the Agency of Natural Resources website: [https://anr.vermont.gov/act171\\_forestplanning](https://anr.vermont.gov/act171_forestplanning).

## **Deer Wintering Areas**

While deer generally accommodate human populations, they require specialized habitat to survive winter conditions. Critical deer wildlife areas are defined and delineated by the Department of Fish and Wildlife. These areas are designated as critical winter habitat for Vermont's deer population because of their vegetation, slope, aspect, and other factors that shelter the deer from the harsh winter. These areas are referred to as deer wintering areas or more commonly "deeryards" and generally consist of areas where coniferous forests dominate. Not only are these sites important, so too are corridors linking them together and to other undeveloped areas in order to facilitate the deer's annual migration from summer to winter habitats. One community's deer wintering areas may serve a population from several miles around. In addition to deer, nearly half of Vermont's vertebrate wildlife species rely on coniferous forests for at least part of their life needs. It is important to note that deer wintering areas are often located on the "edge" between Core Habitat Areas and areas with more densely populated human settlements.

## **Bear Habitat**

In addition to the deer herd, nearly two-thirds of Lamoille County serves as year-round or seasonal black bear habitat. Bears rely heavily on unfragmented, Core Habitat Areas. These are remote areas and travel corridors, often at least ½ mile from development, containing the mass producing, nut bearing trees and wetlands which support breeding populations of bear. Impacts from forest fragmentation can also make it impossible for bears to move from one habitat to another.

## **Wetlands, Riparian Areas, and Aquatic Habitat**

Impacts on fisheries can be categorized as shoreline encroachment, floods, beaver habitats, water withdrawal, erosion, sedimentation, sewage and agricultural runoff, road crossings, and pond construction. Development that occurs too close to a lakeshore or stream bank can cause erosion and destruction of native vegetation which may, in turn, alter the water temperature and lead to eradication or relocation of many aquatic species. Road crossings can inhibit the ability of fish to move from one place to another for feeding and spawning and overall habitat loss. Pond construction, including the sedimentation caused during construction, while benefiting some species, seriously impacts others.

### Avian (Bird) Habitat

Lamoille County is at the epicenter of loon recovery in Vermont. The Green River Reservoir, which hosts one of the longest unfragmented shorelines in the state (19 miles in all), and the neighboring Zack Woods area is one of the highest productivity loon nesting areas in Vermont. Similarly, the cliffs of Smugglers’ Notch are one of only a dozen suitable nesting areas for peregrine falcons in the State.

As State Parks, both Green River Reservoir and Smugglers’ Notch host numerous human visitors. Left unmanaged, these visitors could have negative impacts on these bird recovery efforts. However, appropriate close contact can also engender understanding and support for recovery of these bird populations. As a result, this Plan supports continued education of the public, specifically visitors to the State Parks.

### Rare, Threatened, and Endangered Species

There are at least six threatened and four endangered species known to exist in Lamoille County, as well as another 24 rare species, all of which can be found in the Smugglers’ Notch area (Table 4-2).

Table 4-2. Threatened and Endangered Species in Smugglers’ Notch

Plant Species		Heritage Rank	VT Legal	Date Last Status Documented
Asplenium	viride	S1/G5	Threatened	1994
Calamassp	grostisstricta	S1/G5	Endangered	1908
Carexatra	tiformis	S1/G5	Threatened	1994
Castilleja	septentrionalis	S1/G5	Threatened	1990
Draba	lanceolata	S1/G4 G5	Threatened	1990
Gentiana	amarella	SH/G5	Threatened	1961
Minuartia	rubella	S1/G5	Threatened	1992
Plagiobryum	zierii	S1/G3 G4	Endangered	1989
Lyro	laminor	S1/G5	Endangered	1896
Woodsia	alpina	S1/G5	Endangered	1994
Draba	lanceolata	S1/G4 G5	Threatened	1990
Gentiana	amarella	SH/G5	Threatened	1961
Minuartia	rubella	S1/G5	Threatened	1992
Plagiobryum	zierii	S1/G3 G4	Endangered	1989
Lyro	laminor	S1/G5	Endangered	1896
Woodsia	alpina	S1/G5	Endangered	1994

Table 4-3. Fragile areas in Lamoille County

Fragile Area	Location	Acreage	Critical Features
Mt. Mansfield	Stowe & Underhill	200	Significant extent of alpine tundra, several rare and endangered species
Cambridge Pine Woods	Cambridge	22	Old-age white pine and hemlock stand
Smugglers' Notch	Cambridge	1,424	Arctic plant species, Peregrine Falcon nesting sites, and geologic features
Miller Brook Cirque	Stowe	1,200	Significant example of mountain valley glaciation
Molly Bog	Morristown	20	Exemplary postglacial bog

### Fragile Areas and Natural Areas

Fragile and natural areas in Vermont comprise many of the irreplaceable components of the State's habitats and ecosystems. These resources provide educational, economic, visual, historical, and natural benefits to the State's residents and visitors, both now and in the future. Many of these sites provide important links to our past and aid in our understanding of how our natural environment has changed or may change in the future. Lamoille County hosts five fragile areas, more than any other County in the State. These areas total approximately 2,800 acres. Three of these fragile areas are located on, or in close proximity to, the summit of Mt. Mansfield.

In addition to fragile areas, a Natural Areas Inventory of the State was completed prior to the Fragile Areas Registry. In fact, many of the sites found on the Registry were originally documented in the Natural Areas Inventory which was conducted jointly by the Vermont Natural Resources Council and the State Planning Office during the mid-1970s. There are 47 natural areas listed in Lamoille County, several of which are deer wintering areas, glacial features, and bogs (Table 4-3).

### Protecting the Working Landscape

Preserving agriculture and forest industries is achieved through a number of regulatory and non-regulatory tools, many of which are profiled in the Land Use chapter. In particular, conservation efforts have achieved significant permanent protection of agricultural and forest land through legally binding agreements between a landowner and either 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.

Three land trusts are active within Lamoille County. **The Vermont Land Trust** is a statewide organization that facilitates the implementation of permanent conservation easements to preserve farms, forests, wetlands, and other open space. The organization has conserved more than 360,000 acres of productive forest lands across the State of Vermont. The Vermont Land Trust was active in the conservation of the Atlas Timber Lands in Eden, Belvidere, and Elmore. **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, including the Mayo Farm and Kirchner Woods. **The Nature Conservancy** is an international land protection organization that has protected land in Lamoille County, such as the Babcock Nature Preserve in Eden.

Other land trusts active in Lamoille County include the **Waterville Land Trust**, and the **Northern Rivers Land Trust**, which includes the Lamoille County towns of Wolcott and Elmore, as well as Craftsbury, Greensboro, Hardwick, and Woodbury. Residents of other communities have expressed interest in developing a local or countywide land trust. Smaller communities may have 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.

Regional partnerships can also be a meaningful way to conserve and protect landscapes into the future. One regional example is the **Cold Hollow to Canada Project**, a partnership of community members working together towards a common goal of land stewardship and wildlife habitat conservation. Local conservation commissions, public entities, and non-profit organizations are collaborating with a shared vision of healthy forests and wildlife for future

generations. Through education about sustainable forest stewardship and outreach to empower local forest owners and individuals, the partnership promotes resilient and connected ecosystems in Northern Forests across the region. Waterville and Belvidere are included in the geographic range of this project. For more information, please visit [www.coldhollowtocanada.org/](http://www.coldhollowtocanada.org/).